

Project Title:
Engineer:
Project ID:
Project Descr:

ASCE 7-16 Snow Loads

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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DESCRIPTION: -SNOW DRIFT

Flat Roof Snow Loads

Description :		per ASCE 7-16, Chapter 7	
Ground Snow Load, per Fig 7.2	20.00 psf	Roof Slope, Sec .7.3.4	1.20
Terrain Category	B (see ASCE 7-16 Section 26.7)	Roof Configuration	Monoslope
Exposure of Roof	Fully Exposed		
Ce : Exposure Factor, Table 7.3-	0.90		
Ct : Thermal Factor	1.0 : All not otherwise defined	pm, Minimum required	24.00 psf
Risk Category, per Table 1.5-	IV	pf, Calculated Snow Load per Equation	15.12 psf
Importance Factor, Is, Table 1.5-2	1.20	pf, Design Snow Load Max(pm min, pf calc)	24.00 psf

Snow Drifts on Lower Roofs

Description :		per ASCE 7-16, Chapter 7	
Balanced Snow Load	18.00 psf	hd : leeward	1.93 ft
Ground Snow Load	20.00 psf	hd : windward	2.36 ft
lu - upper	34.00 ft	hd : Max	2.36 ft
lu-lower	82.00 ft	hd : Design	2.36 ft
Height of Roof Step	5.00 ft	pd : Max Drift Only	39.17 psf
Snow Density	16.60 pcf	pd + Balanced	57.17 psf
hb : Balanced	1.08 ft	W : Drift Width	9.44 ft
hc : Step Height - hb	3.92 ft		
hc / hb	3.61	Total Snow Load @ End of Drift	18.00 psf
Importance Factor	1.20		

Description :		per ASCE 7-16, Chapter 7	
Balanced Snow Load	18.00 psf	hd : leeward	1.93 ft
Ground Snow Load	20.00 psf	hd : windward	2.51 ft
lu - upper	34.00 ft	hd : Max	2.51 ft
lu-lower	93.00 ft	hd : Design	2.51 ft
Height of Roof Step	5.00 ft	pd : Max Drift Only	41.73 psf
Snow Density	16.60 pcf	pd + Balanced	59.73 psf
hb : Balanced	1.08 ft	W : Drift Width	10.05 ft
hc : Step Height - hb	3.92 ft		
hc / hb	3.61	Total Snow Load @ End of Drift	18.00 psf
Importance Factor	1.20		

Snow Drifts on Roof Projections

Description :		per ASCE 7-16, Chapt	
Balanced Snow Load	24.00 psf	hd : windward	2.51 ft
Ground Snow Load	20.00 psf	hd : Design	1.55 ft
lu-upwind	93.00 ft	pd : Max Drift Only	25.80 psf
Height of Projection	3.00 ft	pd + Balanced	49.80 psf
Snow Density	16.60 pcf	W : Drift Width	12.43 ft
hb : Balanced	1.45 ft		
hc : Ht. of Projection - hb	1.55 ft		
hc / hb	1.08		
Importance Factor	1.20		

Snow Drifts on Roof Projections

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ASCE 7-16 Snow Loads

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LIC# : KW-06017929, Build:20.24.09.03

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DESCRIPTION: -SNOW DRIFT

Description :			per ASCE 7-16, Chapt
Balanced Snow Load	24.00 psf	hd : windward	2.36 ft
Ground Snow Load	20.00 psf	hd : Design	1.55 ft
lu-upwind	82.00 ft	pd : Max Drift Only	25.80 psf
Height of Projection	3.00 ft	pd + Balanced	49.80 psf
Snow Density	16.60 pcf	W : Drift Width	12.43 ft
hb : Balanced	1.45 ft		
hc : Ht. of Projection - hb	1.55 ft		
hc / hb	1.08		
Importance Factor	1.20		

Description :			per ASCE 7-16, Chapt
Balanced Snow Load	24.00 psf	hd : windward	3.00 ft
Ground Snow Load	20.00 psf	hd : Design	1.55 ft
lu-upwind	134.00 ft	pd : Max Drift Only	25.80 psf
Height of Projection	3.00 ft	pd + Balanced	49.80 psf
Snow Density	16.60 pcf	W : Drift Width	12.43 ft
hb : Balanced	1.45 ft		
hc : Ht. of Projection - hb	1.55 ft		
hc / hb	1.08		
Importance Factor	1.20		

Description :			per ASCE 7-16, Chapt
Balanced Snow Load	24.00 psf	hd : windward	1.19 ft
Ground Snow Load	20.00 psf	hd : Design	1.19 ft
lu-upwind	25.00 ft	pd : Max Drift Only	19.67 psf
Height of Projection	3.00 ft	pd + Balanced	43.67 psf
Snow Density	16.60 pcf	W : Drift Width	4.74 ft
hb : Balanced	1.45 ft		
hc : Ht. of Projection - hb	1.55 ft		
hc / hb	1.08		
Importance Factor	1.20		

Project Title:
Engineer:
Project ID:
Project Descr:

ASCE 7-16 Seismic Base Shear

Project File: Is joint op.ec6

LIC# : KW-06017929, Build:20.24.09.03

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DESCRIPTION: Seismic Base Shear Analysis

Specific Description:

Risk Category

Calculations per ASCE 7-16

Risk Category of Building or Other Structure : "IV" : Buildings and other structures designated as essential facilities. *SCE 7-16, Page 4, Table 1.5-1*

Seismic Importance Factor = 1.5

ASCE 7-16, Page 5, Table 1.5-2

USER DEFINED Ground Motion

ASCE 7-16 11.4.2

Max. Ground Motions, 5% Damping

$S_S = 0.160$ g, 0.2 sec response

$S_1 = 0.0820$ g, 1.0 sec response

For the closest datapoint grid location . . .

Latitude = 0.000 deg North

Longitude = 0.000 deg West

Site Class, Site Coeff. and Design Category

Classification: "B" : Rock : Shear Wave Velocity 2,500 to 5,000 ft/sec = **B** *ASCE 7-16 Table 20.3-1*

Site Coefficients F_a & F_v $F_a = 0.90$ *ASCE 7-16 Table 11.4-1 & 11.4-2*

(using straight-line interpolation from table val

$F_v = 0.80$

Maximum Considered Earthquake Accelerat $S_{MS} = F_a * S_s = 0.144$ *ASCE 7-16 Eq. 11.4-1*

$S_{M1} = F_v * S_1 = 0.066$ *ASCE 7-16 Eq. 11.4-2*

Design Spectral Acceleration $S_{DS} = S_{MS} * 2/3 = 0.096$ *ASCE 7-16 Eq. 11.4-3*

$S_{D1} = S_{M1} * 2/3 = 0.044$ *ASCE 7-16 Eq. 11.4-4*

Seismic Design Category = **A** *ASCE 7-16 Table 11.6-1 & -2*

Seismic Base Shear

ASCE 7-16 Section 12.8.1

$C_s = 0.0100$ from 12.8.1.1

W (see Sum W_i below) = 0.00 k

Seismic Base Shear $V = C_s * W = 0.00$ k

Load Path Connections : Seismic Design Category "A"

ASCE 7-16 Section 11.7

Connections used to form a continuous path of the load resisting system shc
transmitting the seismic force " F_p " indicied by the parts beir

See full text of ASCE 7-16 section 11.7 for all details.



Tekla Tedds

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7306 W 145th Terrace
Overland Park, KS 66223

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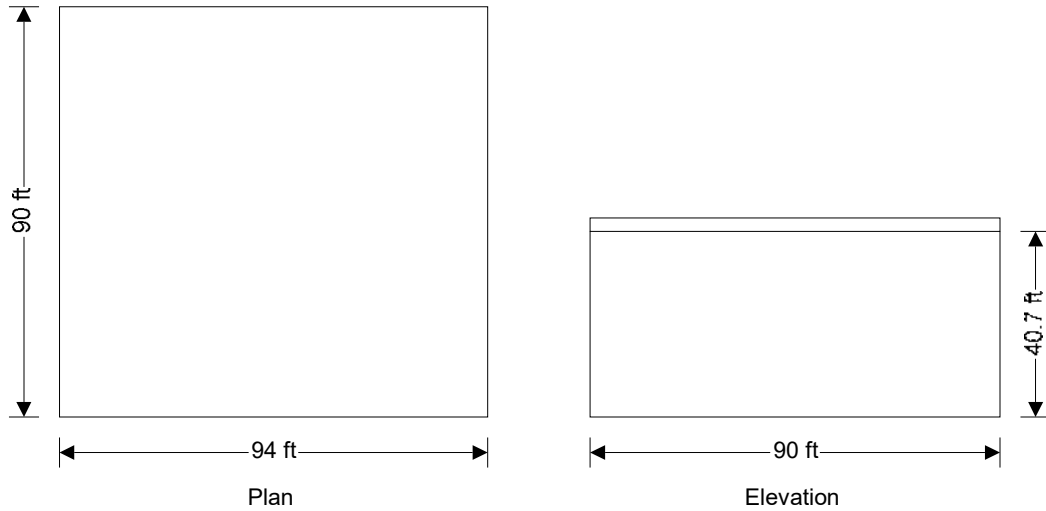
WIND LOADING (ASCE7)

WIND LOADING

In accordance with ASCE7-16

Using the components and cladding design method

Tedds calculation version 2.1.14



Building data

Type of roof	Flat
Length of building	b = 94.00 ft
Width of building	d = 90.00 ft
Height to eaves	H = 40.67 ft
Height of parapet	h _p = 3.00 ft
Mean height	h = 40.67 ft
End zone width	a = max(min(0.1×min(b, d), 0.4×h), 0.04×min(b, d), 3ft) = 9.00 ft

General wind load requirements

Basic wind speed	V = 120.0 mph
Risk category	IV
Velocity pressure exponent coef (Table 26.6-1)	K _d = 0.85
Ground elevation above sea level	Z _{gl} = 0 ft
Ground elevation factor	K _e = exp(-0.0000362 × Z _{gl} /1ft) = 1.00
Exposure category (cl 26.7.3)	B
Enclosure classification (cl.26.12)	Enclosed buildings
Internal pressure coef +ve (Table 26.13-1)	GC _{pi_p} = 0.18
Internal pressure coef -ve (Table 26.13-1)	GC _{pi_n} = -0.18
Parapet internal pressure coef +ve (Table 26.11-1)	GC _{pi_pp} = 0.55
Parapet internal pressure coef -ve (Table 26.11-1)	GC _{pi_np} = -0.55
Gust effect factor	G _f = 0.85

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Topography

Topography factor not significant $K_{zt} = 1.0$

Velocity pressure

Velocity pressure coefficient (Table 26.10-1) $K_z = 0.76$

Velocity pressure $q_h = 0.00256 \times K_z \times K_{zt} \times K_d \times K_e \times V^2 \times 1 \text{ psf/mph}^2 = 23.9 \text{ psf}$

Velocity pressure at parapet

Velocity pressure coefficient (Table 26.10-1) $K_z = 0.78$

Velocity pressure $q_p = 0.00256 \times K_z \times K_{zt} \times K_d \times K_e \times V^2 \times 1 \text{ psf/mph}^2 = 24.4 \text{ psf}$

Peak velocity pressure for internal pressure

Peak velocity pressure – internal (as roof press.) $q_i = 23.92 \text{ psf}$

Equations used in tables

Net pressure $p = q_h \times [GC_p - GC_{pi}]$

Parapet net pressure $p = q_p \times [GC_p - GC_{pi\_p}]$

Components and cladding pressures - Wall (Table 30.3-1 and (Figure 30.3-2A))

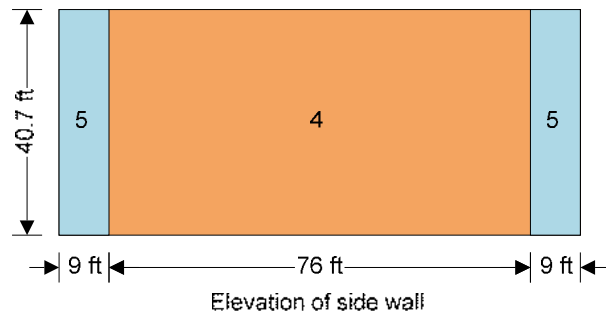
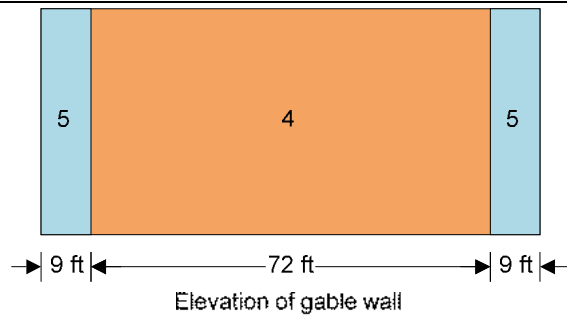
Component	Zone	Length (ft)	Width (ft)	Eff. area (ft ²)	+GC _p	-GC _p	Pres (+ve) (psf)	Pres (-ve) (psf)
<=10 sf	4	-	-	10.0	0.90	-0.99	25.8	-28.0
50 sf	4	-	-	50.0	0.79	-0.88	23.2	-25.3
200 sf	4	-	-	200.0	0.69	-0.78	20.9	-23.0
>500 sf	4	-	-	500.1	0.63	-0.72	19.4	-21.5
<=10 sf	5	-	-	10.0	0.90	-1.26	25.8	-34.4
50 sf	5	-	-	50.0	0.79	-1.04	23.2	-29.1
200 sf	5	-	-	200.0	0.69	-0.85	20.9	-24.6
>500 sf	5	-	-	500.1	0.63	-0.72	19.4	-21.5



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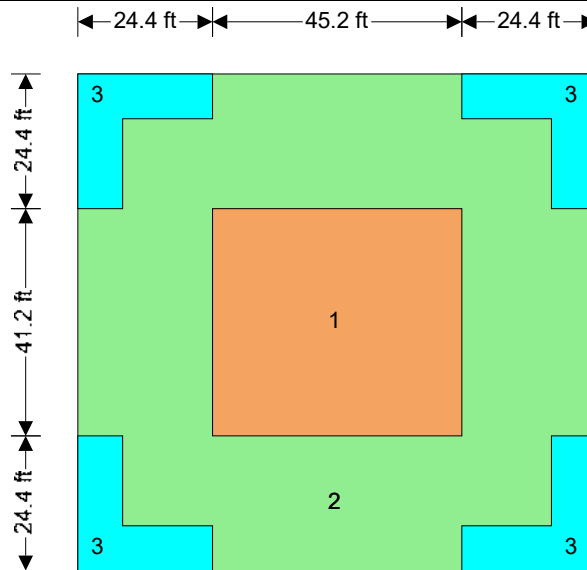


Components and cladding pressures - Roof (Figure 30.3-2A)

Component	Zone	Length (ft)	Width (ft)	Eff. area (ft ²)	+GC _p	-GC _p	Pres (+ve) (psf)	Pres (-ve) (psf)
<=10 sf	1	-	-	10.0	0.30	-1.70	11.5 #	-45.0
100 sf	1	-	-	100.0	0.20	-1.29	9.1 #	-35.1
200 sf	1	-	-	200.0	0.20	-1.16	9.1 #	-32.1
>500 sf	1	-	-	500.1	0.20	-1.00	9.1 #	-28.2
<=10 sf	2	-	-	10.0	0.90	-2.30	25.8	-59.3
100 sf	2	-	-	100.0	0.74	-1.77	22.0	-46.6
200 sf	2	-	-	200.0	0.69	-1.61	20.9	-42.8
>500 sf	2	-	-	500.1	0.63	-1.40	19.4	-37.8
<=10 sf	3	-	-	10.0	0.90	-2.30	25.8	-59.3
100 sf	3	-	-	100.0	0.74	-1.77	22.0	-46.6
200 sf	3	-	-	200.0	0.69	-1.61	20.9	-42.8
>500 sf	3	-	-	500.1	0.63	-1.40	19.4	-37.8

The final net design wind pressure, including all permitted reductions, used in the design shall not be less than 16psf acting in either direction

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Plan on roof

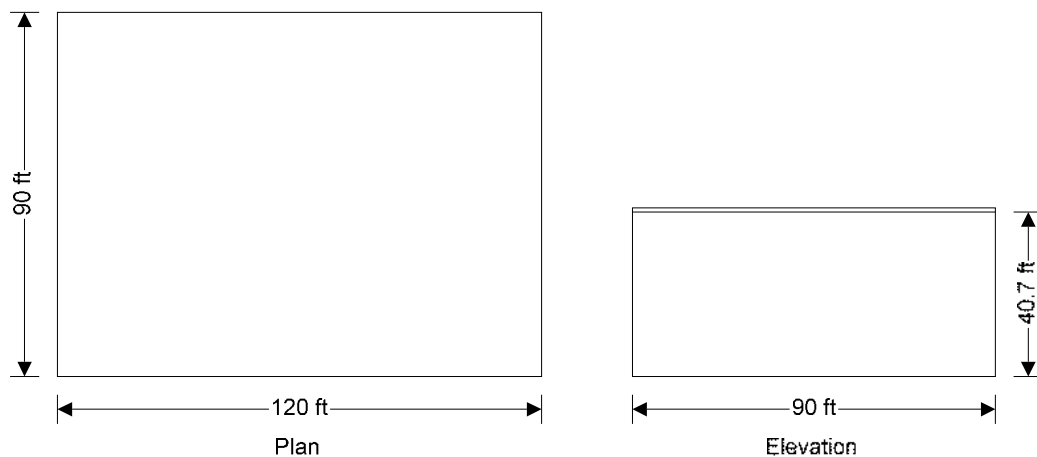
WIND LOADING (ASCE7)

WIND LOADING

In accordance with ASCE7-16

Using the directional design method

Tedds calculation version 2.1.14



Building data

Type of roof	Flat
Length of building	b = 120.00 ft
Width of building	d = 90.00 ft
Height to eaves	H = 40.67 ft

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Height of parapet $h_p = 1.00$ ft

Mean height $h = 40.67$ ft

General wind load requirements

Basic wind speed $V = 120.0$ mph

Risk category IV

Velocity pressure exponent coef (Table 26.6-1) $K_d = 0.85$

Ground elevation above sea level $z_{gl} = 0$ ft

Ground elevation factor $K_e = \exp(-0.0000362 \times z_{gl}/1\text{ft}) = 1.00$

Exposure category (cl 26.7.3) B

Enclosure classification (cl.26.12) Enclosed buildings

Internal pressure coef +ve (Table 26.13-1) $GC_{pi\_p} = 0.18$

Internal pressure coef -ve (Table 26.13-1) $GC_{pi\_n} = -0.18$

Gust effect factor $G_f = 0.85$

Minimum design wind loading (cl.27.1.5) $p_{min\_r} = 8$ lb/ft²

Topography

Topography factor not significant $K_{zt} = 1.0$

Velocity pressure equation $q = 0.00256 \times K_z \times K_{zt} \times K_d \times V^2 \times 1\text{psf}/\text{mph}^2$

Velocity pressures table

z (ft)	K_z (Table 26.10-1)	q_z (psf)
15.00	0.57	17.86
25.00	0.66	20.68
40.67	0.76	23.92
41.67	0.77	24.08

Peak velocity pressure for internal pressure

Peak velocity pressure – internal (as roof press.) $q_i = 23.92$ psf

Parapet pressures and forces

Velocity pressure at top of parapet $q_p = 24.08$ psf

Combined net pressure coefficient, leeward $GC_{pnl} = -1.0$

Combined net parapet pressure, leeward $p_{pl} = q_p \times GC_{pnl} = -24.08$ psf

Combined net pressure coefficient, windward $GC_{pnw} = 1.5$

Combined net parapet pressure, windward $p_{pw} = q_p \times GC_{pnw} = 36.11$ psf

Wind direction 0 deg:

Leeward parapet force $F_{w,wpl\_0} = p_{pl} \times h_p \times b = -2.9$ kips

Windward parapet force $F_{w,wpw\_0} = p_{pw} \times h_p \times b = 4.3$ kips

Wind direction 90 deg:

Leeward parapet force $F_{w,wpl\_90} = p_{pl} \times h_p \times d = -2.2$ kips

Windward parapet force $F_{w,wpw\_90} = p_{pw} \times h_p \times d = 3.3$ kips

Pressures and forces

Net pressure $p = q \times G_f \times C_{pe} - q_i \times GC_{pi}$

Net force $F_w = p \times A_{ref}$

Roof load case 1 - Wind 0, GC_{pi} 0.18, $-C_{pe}$

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Zone	Ref. height (ft)	Ext pressure coefficient c_{pe}	Peak velocity pressure q_p (psf)	Net pressure p (psf)	Area A_{ref} (ft ²)	Net force F_w (kips)
A (-ve)	40.67	-0.90	23.92	-22.60	2440.20	-55.16
B (-ve)	40.67	-0.90	23.92	-22.60	2440.20	-55.16
C (-ve)	40.67	-0.50	23.92	-14.47	4880.40	-70.62
D (-ve)	40.67	-0.30	23.92	-10.40	1039.20	-10.81

Total vertical net force $F_{w,v} = -191.75$ kips

Total horizontal net force $F_{w,h} = 0.00$ kips

Walls load case 1 - Wind 0, $GC_{pi} 0.18$, $-c_{pe}$

Zone	Ref. height (ft)	Ext pressure coefficient c_{pe}	Peak velocity pressure q_p (psf)	Net pressure p (psf)	Area A_{ref} (ft ²)	Net force F_w (kips)
A ₁	15.00	0.80	17.86	7.84	1800.00	14.11
A ₂	25.00	0.80	20.68	9.76	1200.00	11.71
A ₃	40.67	0.80	23.92	11.96	1880.40	22.49
B	40.67	-0.50	23.92	-14.47	4880.40	-70.62
C	40.67	-0.70	23.92	-18.54	3660.30	-67.85
D	40.67	-0.70	23.92	-18.54	3660.30	-67.85

Overall loading

Projected vertical plan area of wall

$$A_{vert\_w\_0} = b \times (H + h_p) = 5000.40 \text{ ft}^2$$

Projected vertical area of roof

$$A_{vert\_r\_0} = 0.00 \text{ ft}^2$$

Minimum overall horizontal loading

$$F_{w,total\_min} = p_{min\_w} \times A_{vert\_w\_0} + p_{min\_r} \times A_{vert\_r\_0} = 80.01 \text{ kips}$$

Leeward net force

$$F_l = F_{w,wB} + F_{w,wpl\_0} = -73.5 \text{ kips}$$

Windward net force

$$F_w = F_{w,wA\_1} + F_{w,wA\_2} + F_{w,wA\_3} + F_{w,wpw\_0} = 52.6 \text{ kips}$$

Overall horizontal loading

$$F_{w,total} = \max(F_w - F_l + F_{w,h}, F_{w,total\_min}) = 126.2 \text{ kips}$$

Roof load case 2 - Wind 0, $GC_{pi} -0.18$, $-0c_{pe}$

Zone	Ref. height (ft)	Ext pressure coefficient c_{pe}	Peak velocity pressure q_p (psf)	Net pressure p (psf)	Area A_{ref} (ft ²)	Net force F_w (kips)
A (+ve)	40.67	-0.18	23.92	0.65	2440.20	1.58
B (+ve)	40.67	-0.18	23.92	0.65	2440.20	1.58
C (+ve)	40.67	-0.18	23.92	0.65	4880.40	3.15
D (+ve)	40.67	-0.18	23.92	0.65	1039.20	0.67

Total vertical net force $F_{w,v} = 6.97$ kips

Total horizontal net force $F_{w,h} = 0.00$ kips

Walls load case 2 - Wind 0, $GC_{pi} -0.18$, $-0c_{pe}$

Zone	Ref. height (ft)	Ext pressure coefficient c_{pe}	Peak velocity pressure q_p (psf)	Net pressure p (psf)	Area A_{ref} (ft ²)	Net force F_w (kips)
A ₁	15.00	0.80	17.86	16.45	1800.00	29.61

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			Checked by		Checked date	
			Approved by		Approved date	

Zone	Ref. height (ft)	Ext pressure coefficient c_{pe}	Peak velocity pressure q_p (psf)	Net pressure p (psf)	Area A_{ref} (ft ²)	Net force F_w (kips)
A ₂	25.00	0.80	20.68	18.37	1200.00	22.04
A ₃	40.67	0.80	23.92	20.57	1880.40	38.68
B	40.67	-0.50	23.92	-5.86	4880.40	-28.60
C	40.67	-0.70	23.92	-9.93	3660.30	-36.33
D	40.67	-0.70	23.92	-9.93	3660.30	-36.33

Overall loading

Projected vertical plan area of wall

$A_{vert\_w\_0} = b \times (H+ h_p) = 5000.40 \text{ ft}^2$

Projected vertical area of roof

$A_{vert\_r\_0} = 0.00 \text{ ft}^2$

Minimum overall horizontal loading

$F_{w,total\_min} = p_{min\_w} \times A_{vert\_w\_0} + p_{min\_r} \times A_{vert\_r\_0} = 80.01 \text{ kips}$

Leeward net force

$F_l = F_{w,wB} + F_{w,wpl\_0} = -31.5 \text{ kips}$

Windward net force

$F_w = F_{w,wA\_1} + F_{w,wA\_2} + F_{w,wA\_3} + F_{w,wpw\_0} = 94.7 \text{ kips}$

Overall horizontal loading

$F_{w,total} = \max(F_w - F_l + F_{w,h}, F_{w,total\_min}) = 126.2 \text{ kips}$

Roof load case 3 - Wind 90, GC_{pi} 0.18, $-c_{pe}$

Zone	Ref. height (ft)	Ext pressure coefficient c_{pe}	Peak velocity pressure q_p (psf)	Net pressure p (psf)	Area A_{ref} (ft ²)	Net force F_w (kips)
A (-ve)	40.67	-0.90	23.92	-22.60	1830.15	-41.37
B (-ve)	40.67	-0.90	23.92	-22.60	1830.15	-41.37
C (-ve)	40.67	-0.50	23.92	-14.47	3660.30	-52.97
D (-ve)	40.67	-0.30	23.92	-10.40	3479.40	-36.20

Total vertical net force

$F_{w,v} = -171.91 \text{ kips}$

Total horizontal net force

$F_{w,h} = 0.00 \text{ kips}$

Walls load case 3 - Wind 90, GC_{pi} 0.18, $-c_{pe}$

Zone	Ref. height (ft)	Ext pressure coefficient c_{pe}	Peak velocity pressure q_p (psf)	Net pressure p (psf)	Area A_{ref} (ft ²)	Net force F_w (kips)
A ₁	15.00	0.80	17.86	7.84	1350.00	10.58
A ₂	25.00	0.80	20.68	9.76	900.00	8.78
A ₃	40.67	0.80	23.92	11.96	1410.30	16.87
B	40.67	-0.43	23.92	-13.12	3660.30	-48.01
C	40.67	-0.70	23.92	-18.54	4880.40	-90.47
D	40.67	-0.70	23.92	-18.54	4880.40	-90.47

Overall loading

Projected vertical plan area of wall

$A_{vert\_w\_90} = d \times (H+ h_p) = 3750.30 \text{ ft}^2$

Projected vertical area of roof

$A_{vert\_r\_90} = 0.00 \text{ ft}^2$

Minimum overall horizontal loading

$F_{w,total\_min} = p_{min\_w} \times A_{vert\_w\_90} + p_{min\_r} \times A_{vert\_r\_90} = 60.00 \text{ kips}$

Leeward net force

$F_l = F_{w,wB} + F_{w,wpl\_90} = -50.2 \text{ kips}$

Windward net force

$F_w = F_{w,wA\_1} + F_{w,wA\_2} + F_{w,wA\_3} + F_{w,wpw\_90} = 39.5 \text{ kips}$

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Overall horizontal loading $F_{w,total} = \max(F_w - F_l + F_{w,h}, F_{w,total\_min}) = 89.7$ kips

Roof load case 4 - Wind 90, $GC_{pi} -0.18$, $+c_{pe}$

Zone	Ref. height (ft)	Ext pressure coefficient c_{pe}	Peak velocity pressure q_p (psf)	Net pressure p (psf)	Area A_{ref} (ft ²)	Net force F_w (kips)
A (+ve)	40.67	-0.18	23.92	0.65	1830.15	1.18
B (+ve)	40.67	-0.18	23.92	0.65	1830.15	1.18
C (+ve)	40.67	-0.18	23.92	0.65	3660.30	2.36
D (+ve)	40.67	-0.18	23.92	0.65	3479.40	2.25

Total vertical net force $F_{w,v} = 6.97$ kips

Total horizontal net force $F_{w,h} = 0.00$ kips

Walls load case 4 - Wind 90, $GC_{pi} -0.18$, $+c_{pe}$

Zone	Ref. height (ft)	Ext pressure coefficient c_{pe}	Peak velocity pressure q_p (psf)	Net pressure p (psf)	Area A_{ref} (ft ²)	Net force F_w (kips)
A ₁	15.00	0.80	17.86	16.45	1350.00	22.21
A ₂	25.00	0.80	20.68	18.37	900.00	16.53
A ₃	40.67	0.80	23.92	20.57	1410.30	29.01
B	40.67	-0.43	23.92	-4.50	3660.30	-16.49
C	40.67	-0.70	23.92	-9.93	4880.40	-48.44
D	40.67	-0.70	23.92	-9.93	4880.40	-48.44

Overall loading

Projected vertical plan area of wall

$$A_{vert\_w\_90} = d \times (H + h_p) = 3750.30 \text{ ft}^2$$

Projected vertical area of roof

$$A_{vert\_r\_90} = 0.00 \text{ ft}^2$$

Minimum overall horizontal loading

$$F_{w,total\_min} = p_{min\_w} \times A_{vert\_w\_90} + p_{min\_r} \times A_{vert\_r\_90} = 60.00 \text{ kips}$$

Leeward net force

$$F_l = F_{w,wB} + F_{w,wpl\_90} = -18.7 \text{ kips}$$

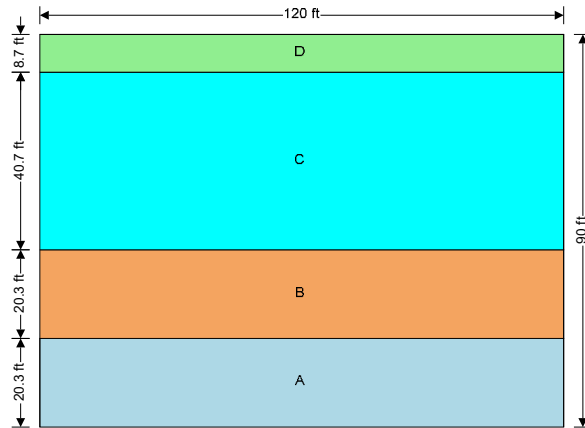
Windward net force

$$F_w = F_{w,wA\_1} + F_{w,wA\_2} + F_{w,wA\_3} + F_{w,wpw\_90} = 71.0 \text{ kips}$$

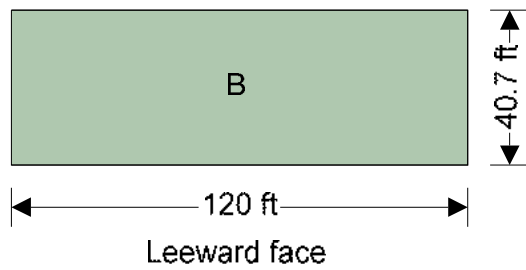
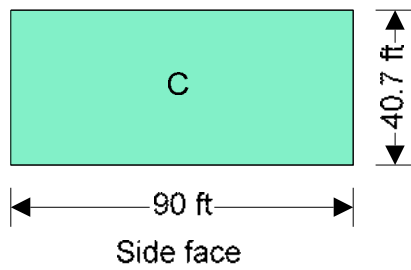
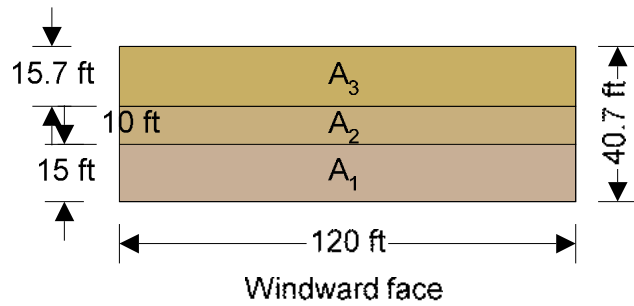
Overall horizontal loading

$$F_{w,total} = \max(F_w - F_l + F_{w,h}, F_{w,total\_min}) = 89.7 \text{ kips}$$

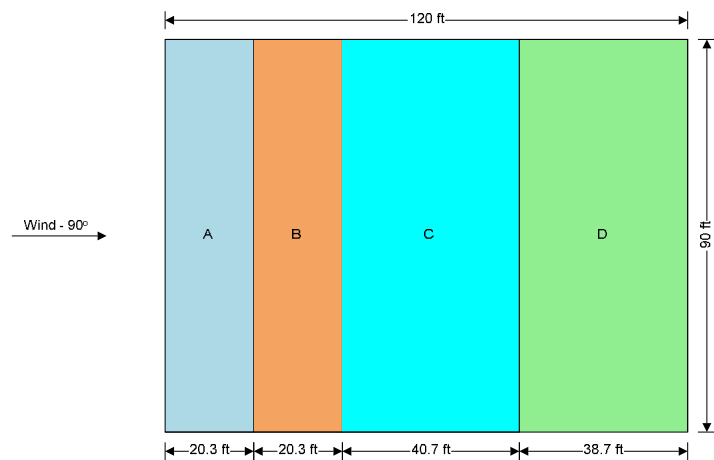
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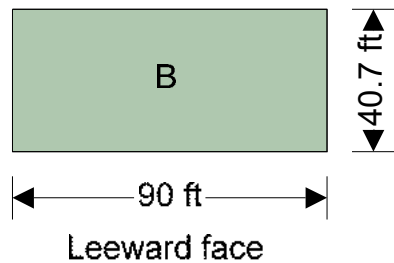
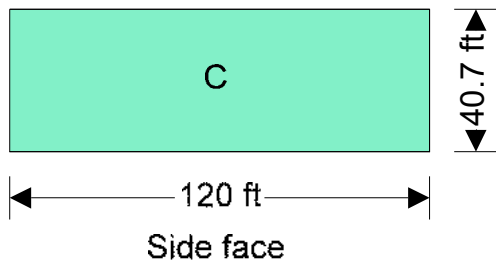
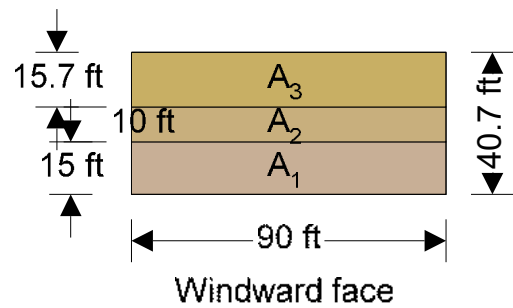
Wind - 0°
Plan view - Flat roof

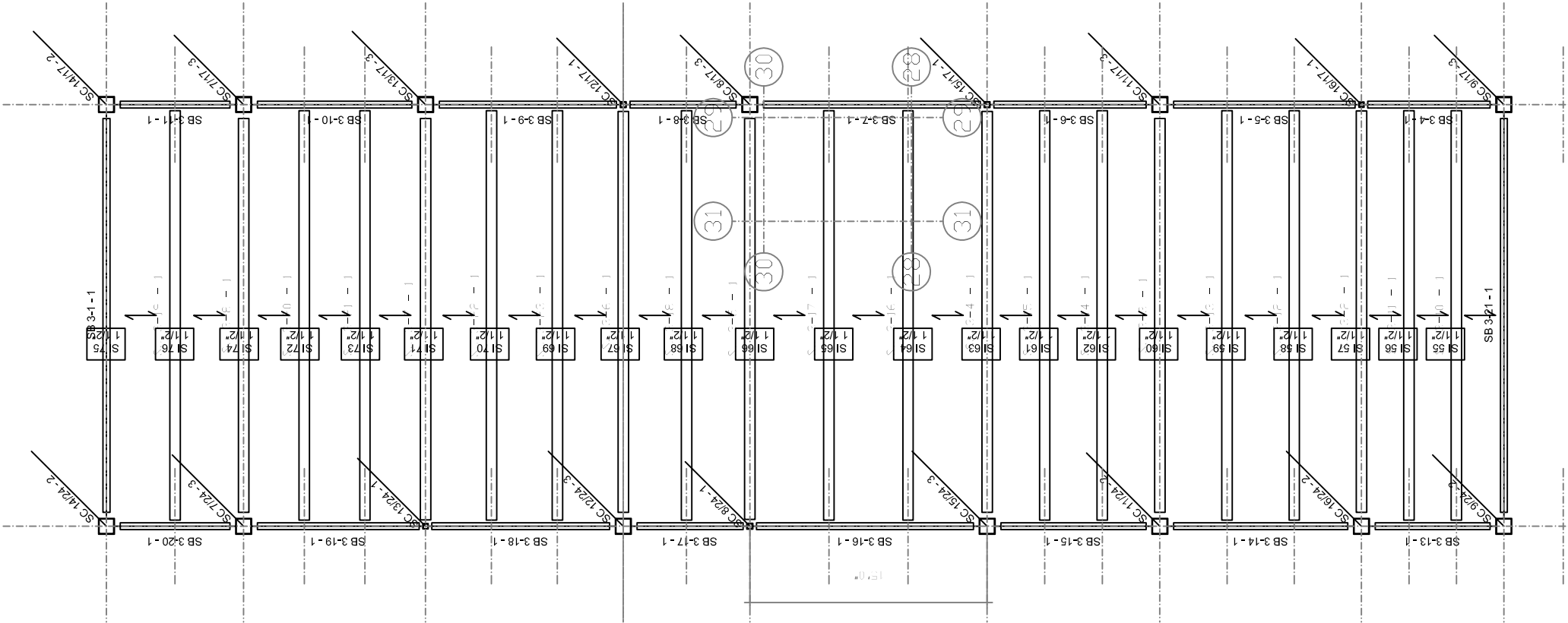


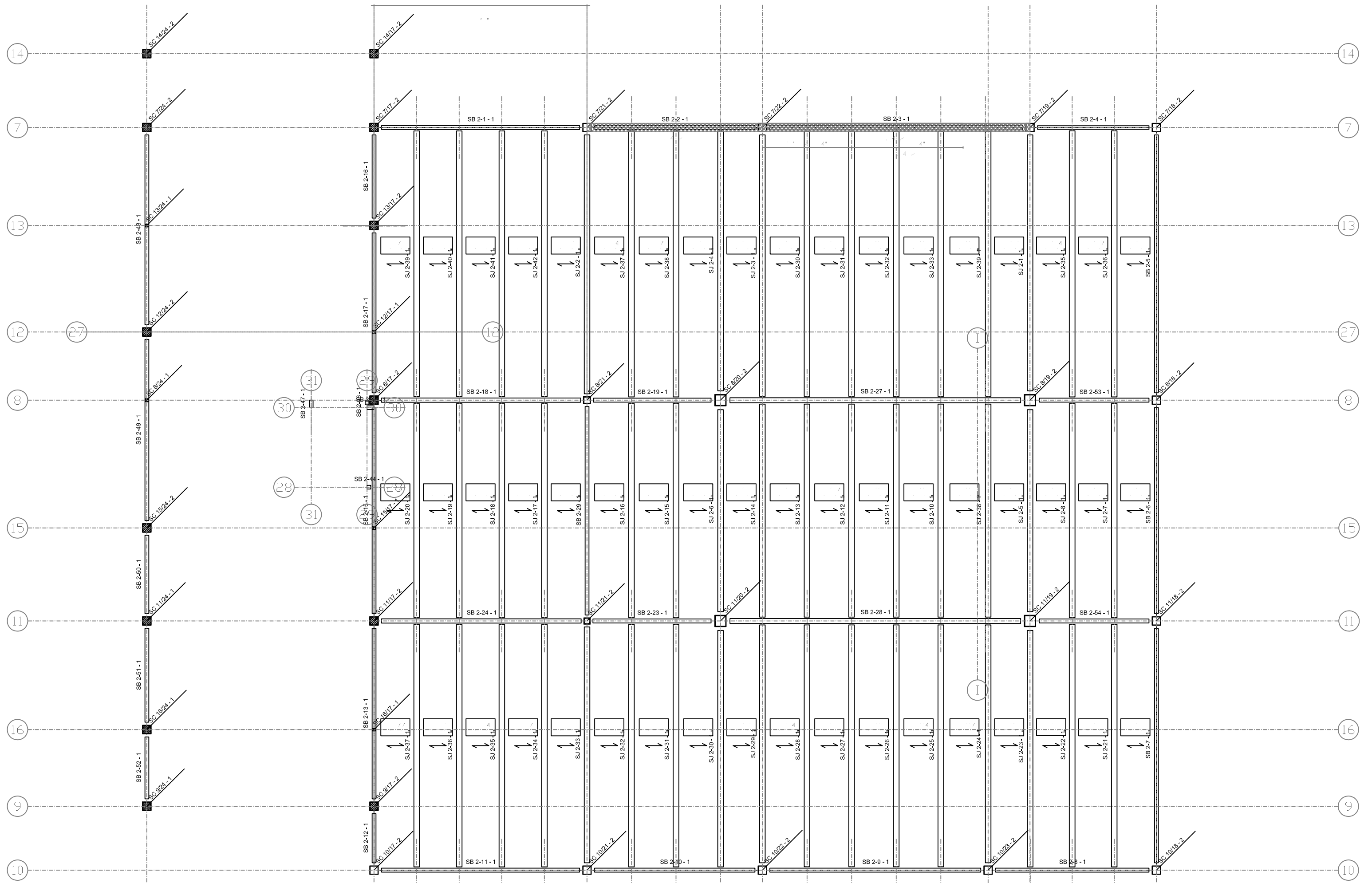
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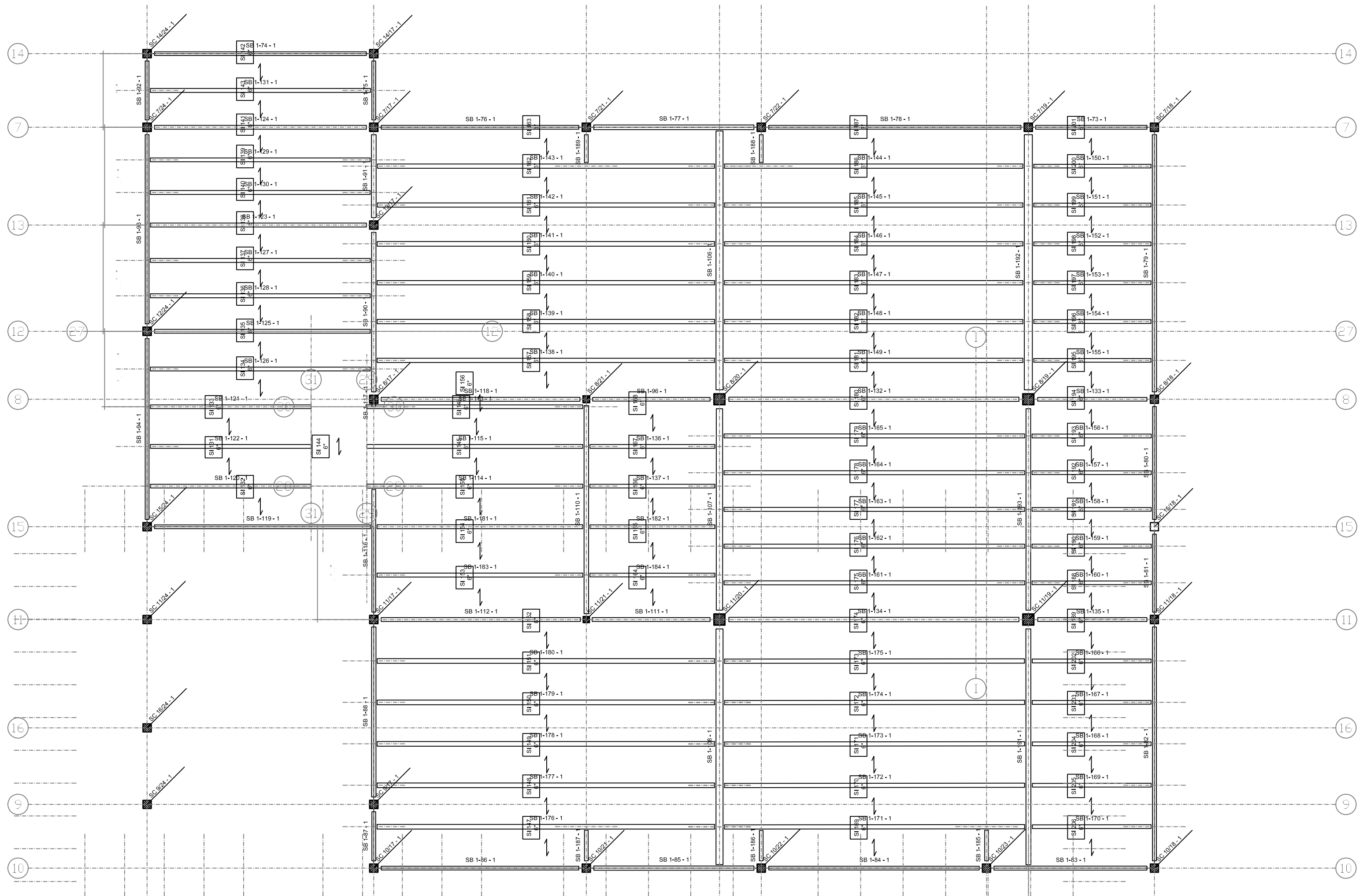


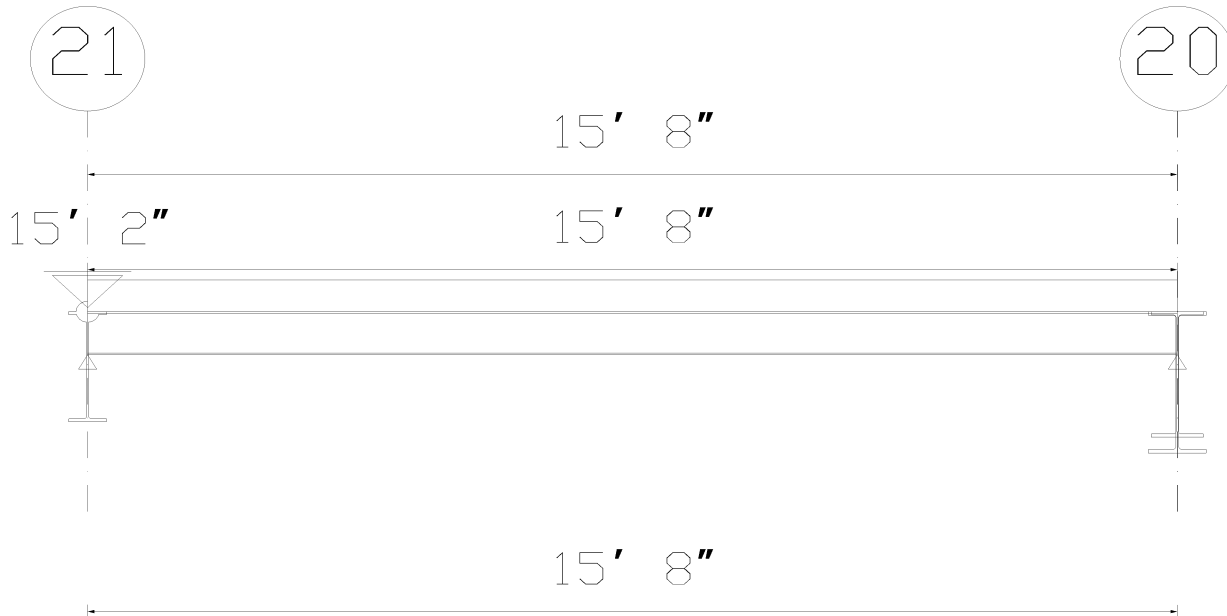
Plan view - Flat roof











Second Level: SB 1-96 - 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	15' 8"	•	1.000		1.000		1.000		1.000
support	15' 8"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	2	10.2	56.2	kip	0.182	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	40.0	63.7	kip ft	0.628	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.014	-	in	-	-
Deflection Slab	2	0.227	0.783	in	0.290	✓ Pass
Deflection Dead	2	0.078	0.522	in	0.150	✓ Pass
Deflection Live	2	0.391	0.522	in	0.749	✓ Pass
Deflection Total	2	0.710	0.783	in	0.907	✓ Pass



Project

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Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 7' 10" - Critical

Moment, M_x =15.5 kip ft

Elastic modulus of steel, E =29000 ksi

Minimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in

Required major axis shear strength, V_{ry} =10.2 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =**0.182**



Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 10" - Critical

Dist of M_{rx} along member =7' 10" ft, in

Required flexural strength, M_{rx1} =40.0 kip ft

Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3

Ratio =**0.628**



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =7' 10" ft, in

Max. Total load deflection =0.710 in

Span over limit =0.783 in

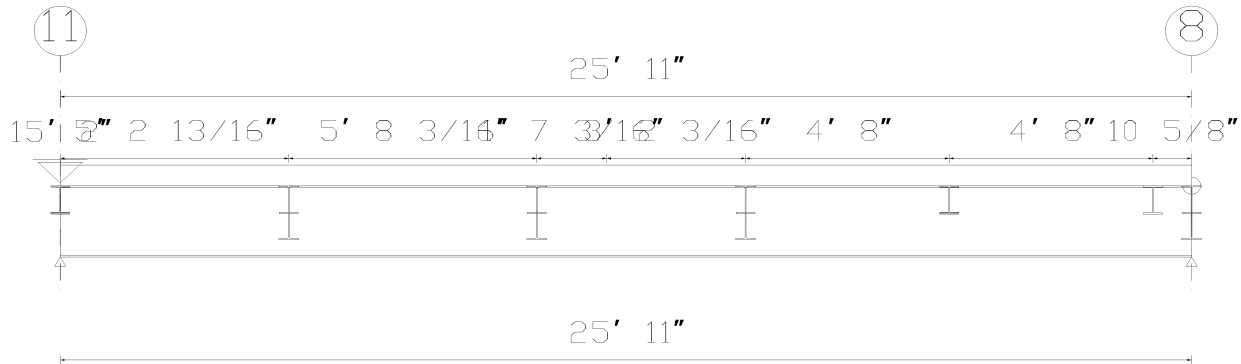
Design limit =0.783 in

Utilization Ratio =**0.907**



Pass

SB 1-110



Second Level: SB 1-110 = 1 (W 21x50 A992-50)

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	5' 2 3/4"	•	1.000		1.000		1.000		1.000
member	5' 2 3/4"	•						•	
sub-beam	5' 8 1/4"	•	1.000		1.000		1.000		1.000
member	10' 11"	•						•	
sub-beam	1' 7 1/8"	•	1.000		1.000		1.000		1.000
member	12' 6 1/8"					•			
sub-beam	3' 2 1/8"	•	1.000		1.000		1.000		1.000
member	15' 8 3/8"	•						•	
sub-beam	4' 8"	•	1.000		1.000		1.000		1.000
member	20' 4 3/8"	•						•	
sub-beam	4' 8"	•	1.000		1.000		1.000		1.000
member	25' 3/8"	•						•	
sub-beam	10' 5/8"	•	1.000		1.000		1.000		1.000
support	25' 11"	•		•		•		•	

Static Design Summary

Summary W 21x50

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	2	-44.8	237.1	kip	0.189	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	-105.1	127.3	kip ft	0.825	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.002	-	in	-	-
Deflection Slab	2	-0.014	1.296	in	0.011	✓ Pass
Deflection Dead	2	-0.008	0.864	in	0.009	✓ Pass
Deflection Live	2	0.043	0.864	in	0.050	✓ Pass
Deflection Total	2	0.055	1.296	in	0.043	✓ Pass



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Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 21x50 A992-50 - Critical

Flexural: Position 3' 11 7/8" - Critical

Moment, M_x =16.6 kip ft

Elastic modulus of steel, E =29000 ksi

Minimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x50 A992-50 - Critical

Position 12' 6 1/8" - Critical

Position of V_{ry} =12' 6 1/8" ft, in

Required major axis shear strength, V_{ry} =-44.8 kip

Design shear strength =237.1 kip AISC 360 G2

Ratio =0.189



Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x50 A992-50 - Critical

LTB Flange Btm: 0" - 25' 11" - Critical

Dist of M_{rx1} along member =12' 6 1/8" ft, in

Required flexural strength, M_{rx1} =-105.1 kip ft

Design flexural strength =127.3 kip ft AISC 360 F1, F2, F3 and F4

Ratio =0.825



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x50 A992-50 - Critical

Deflection Live - Critical

Position Live load deflection =19' 2" ft, in

Max. Live load deflection =0.043 in

Span over limit =0.864 in

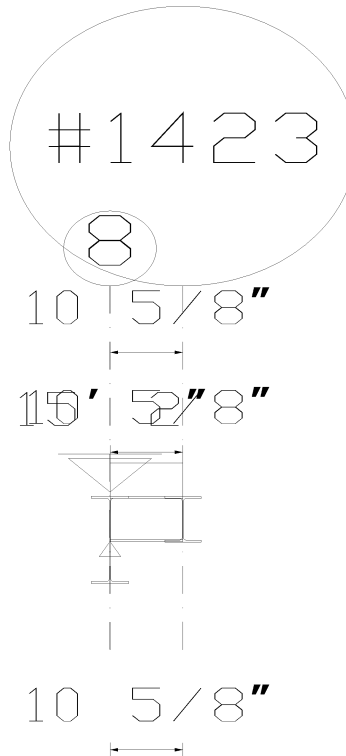
Design limit =0.864 in

Utilization Ratio =0.050



Pass

SB 1-117



Second Level: SB 1-117 = 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	10 5/8"	•	1.000		1.000		1.000		1.000
support	10 5/8"	•		•		•		•	

Static Design Summary

Summary W 8x18

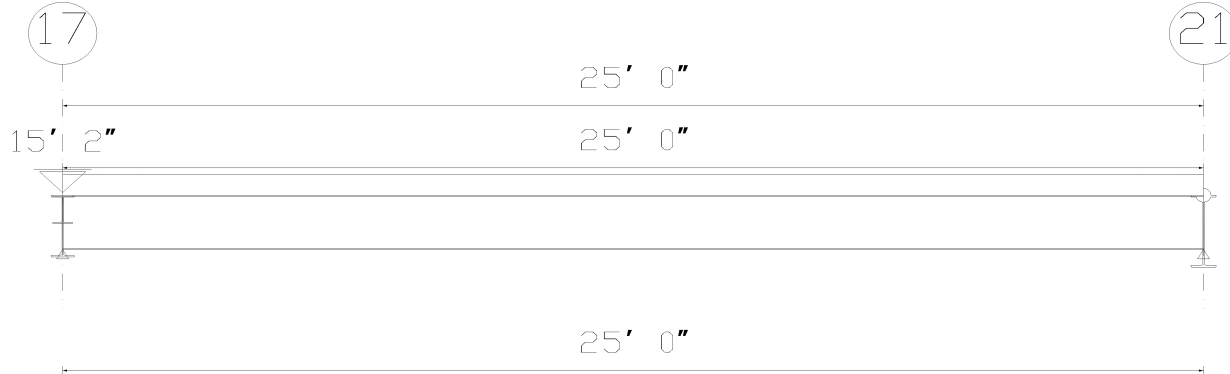
Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification		Unknown	-	-	-	Not required
Shear Major		No Significant Forces		kip	-	Not required
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major		No Significant Forces		kip ft	-	Not required
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

SB 1-117 - No results available.

SB 1-118



Second Level: SB 1-118 = 1
W 16x26 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	25' 0"	•	1.000		1.000		1.000		1.000
support	25' 0"	•		•		•		•	

Static Design Summary

Summary W 16x26

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	2	9.0	106.0	kip	0.085	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	56.5	165.7	kip ft	0.341	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.027	-	in	-	-
Deflection Slab	2	0.163	1.250	in	0.130	✓ Pass
Deflection Dead	2	0.056	0.833	in	0.067	✓ Pass
Deflection Live	2	0.281	0.833	in	0.337	✓ Pass
Deflection Total	2	0.526	1.250	in	0.421	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 12' 6" - Critical



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Moment, M_x = 22.8 kip ft
Elastic modulus of steel, E = 29000 ksi
Minimum yield stress, F_y = 50.00 ksi
Flexural section class Compact AISC 360 Table B4.1b

Shear Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 9.0 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.085



Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Yielding: 12' 6" - Critical

Dist of M_{rx} along member = 12' 6" ft, inRequired flexural strength, M_{rx1} = 56.5 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.341



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 12' 6" ft, in

Max. Total load deflection = 0.526 in

Span over limit = 1.250 in

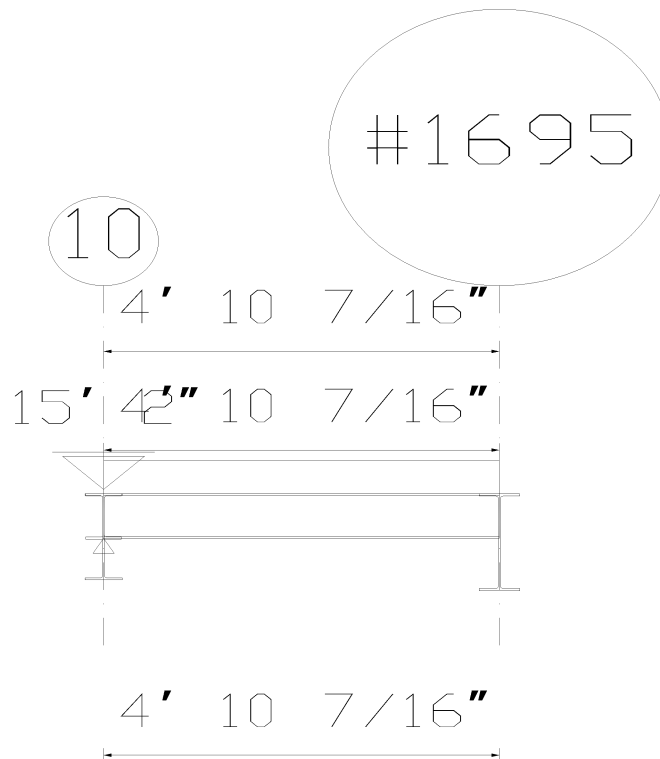
Design limit = 1.250 in

Utilization Ratio = 0.421



Pass

SB 1-185



Second Level: SB 1-185 - 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 10 1/2"	•	1.000		1.000		1.000		1.000
support	4' 10 1/2"	•		•		•		•	

Static Design Summary

Summary W 8x18

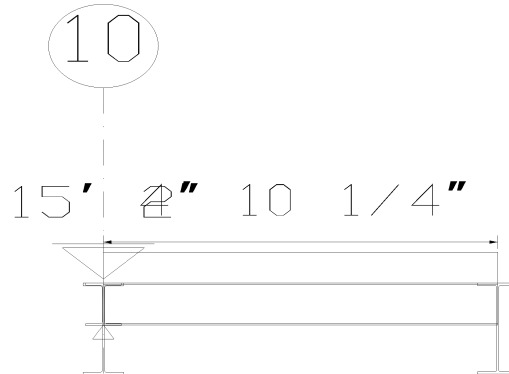
Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification		Unknown	-	-	-	Not required
Shear Major		No Significant Forces		kip	-	Not required
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major		No Significant Forces		kip ft	-	Not required
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

SB 1-185 - No results available.

SB 1-186



Second Level: SB 1-186 - 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 10 1/4"	•	1.000		1.000		1.000		1.000
support	4' 10 1/4"	•		•		•		•	

Static Design Summary

Summary W 8x18

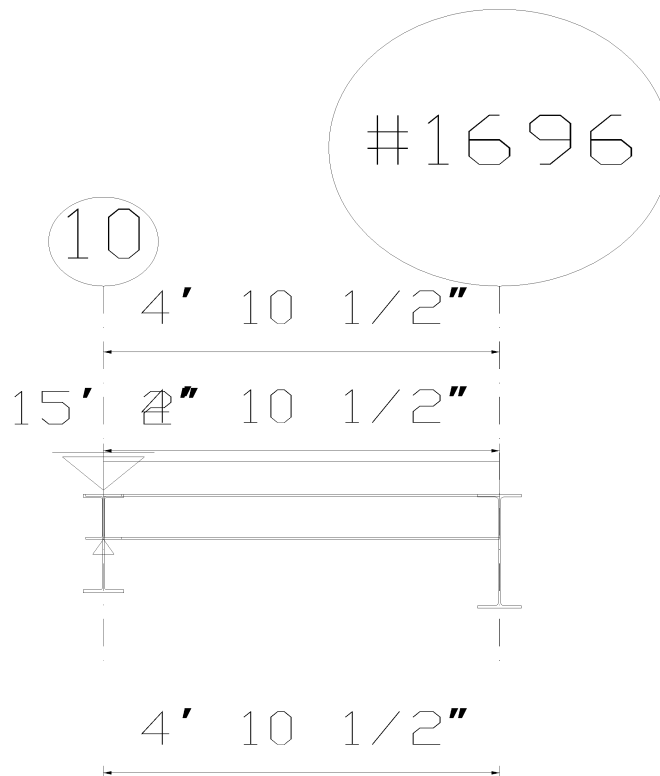
Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification		Unknown	-	-	-	Not required
Shear Major		No Significant Forces		kip	-	Not required
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major		No Significant Forces		kip ft	-	Not required
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

SB 1-186 - No results available.

SB 1-187



Second Level: SB 1-187 - 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 10 1/2"	•	1.000		1.000		1.000		1.000
support	4' 10 1/2"	•		•		•		•	

Static Design Summary

Summary W 8x18

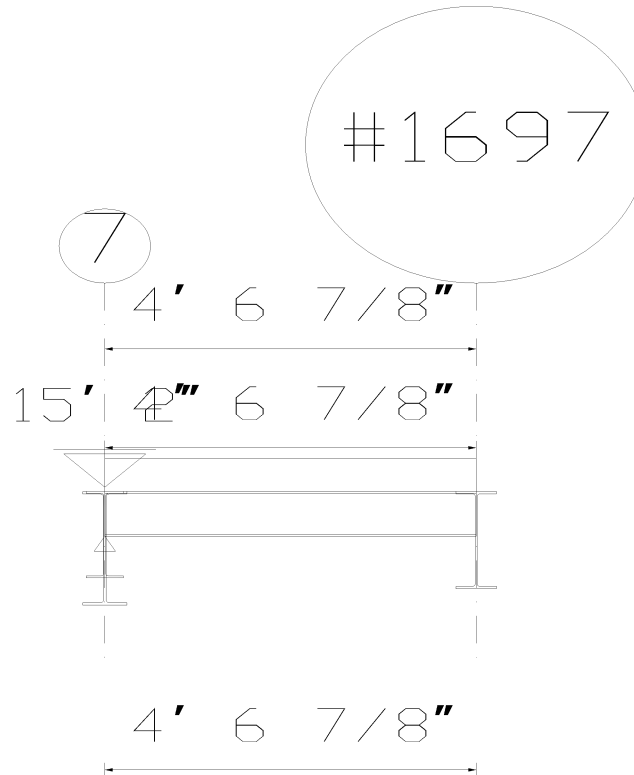
Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification		Unknown	-	-	-	Not required
Shear Major		No Significant Forces		kip	-	Not required
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major		No Significant Forces		kip ft	-	Not required
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

SB 1-187 - No results available.

SB 1-188



Second Level: SB 1-188 = 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 6 7/8"	•	1.000		1.000		1.000		1.000
support	4' 6 7/8"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification		Unknown	-	-	-	Not required
Shear Major		No Significant Forces		kip	-	Not required
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major		No Significant Forces		kip ft	-	Not required
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required

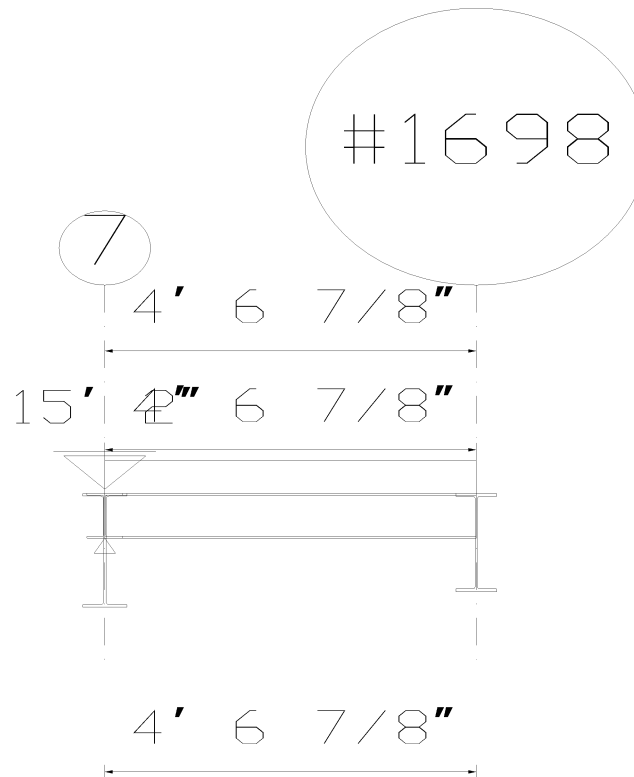
Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

SB 1-188 - No results available.

SB 1-189



Second Level: SB 1-189 - 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 6 7/8"	•	1.000		1.000		1.000		1.000
support	4' 6 7/8"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification		Unknown	-	-	-	Not required
Shear Major		No Significant Forces		kip	-	Not required

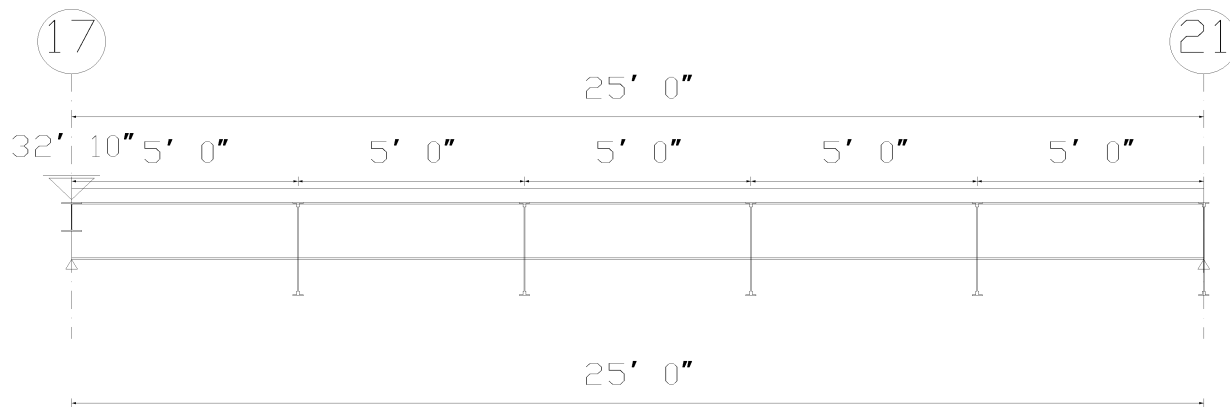
Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major		No Significant Forces		kip ft	-	Not required
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

SB 1-189 - No results available.

SB 2-1



Roof: SB 2-1 - 1 (W 16x31 A992-50)

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
member	5' 0"	•						•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
member	10' 0"	•						•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
member	15' 0"	•						•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
member	20' 0"	•						•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
support	25' 0"	•		•		•		•	

Static Design Summary

Summary W 16x31

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	16.3	131.2	kip	0.124	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	121.5	202.5	kip ft	0.600	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.046	-	in	-	-
Deflection Slab	2	0.714	1.250	in	0.571	✓ Pass
Deflection Dead	2	0.320	0.833	in	0.384	✓ Pass
Deflection Total	1	1.080	1.250	in	0.864	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 16x31 A992-50 - Critical

Flexural: Position 5' 0" - Critical

Moment, M_x = 80.9 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 16x31 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 16.3 kip

Design shear strength = 131.2 kip AISC 360 G2

Ratio = 0.124

✓ Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

Yielding: 12' 6" - Critical

Dist of M_{rx} along member = 12' 6" ft, in

Required flexural strength, M_{rx1} = 121.5 kip ft

Design flexural strength = 202.5 kip ft AISC 360 F1, F2 and F3

Ratio = 0.600

✓ Pass

Deflection

1 Construction Stage - Critical

Span 1 W 16x31 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 12' 6" ft, in

Max. Total load deflection = 1.080 in

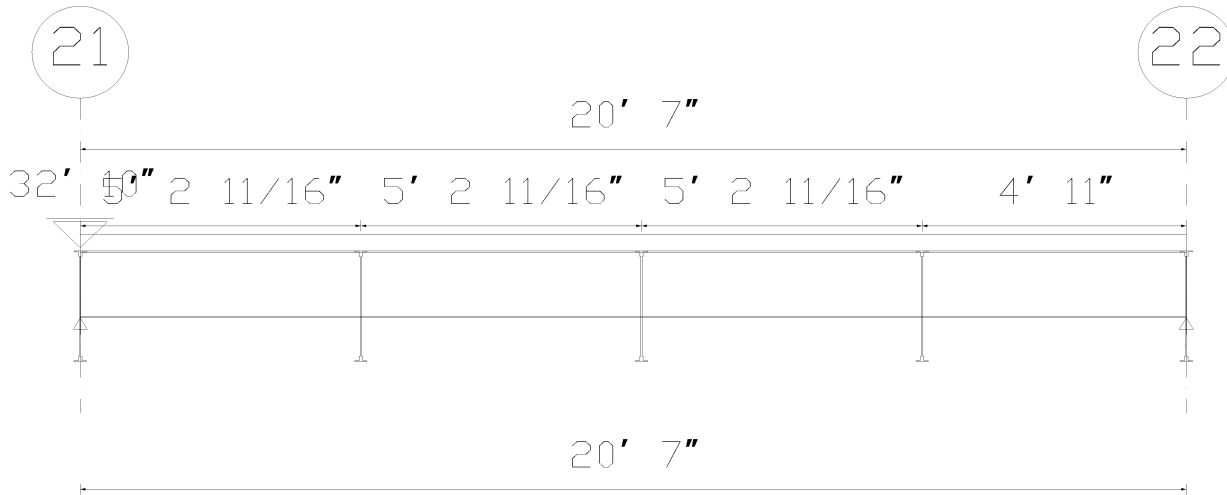
Span over limit = 1.250 in

Design limit = 1.250 in

Utilization Ratio = 0.864

✓ Pass

SB 2-2



Roof: SB 2-2 - 1 (W 16x26 A992-50)

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	5' 2 5/8"	•	1.000		1.000		1.000		1.000
member	5' 2 5/8"	•						•	
sub-beam	5' 2 5/8"	•	1.000		1.000		1.000		1.000
member	10' 5 3/8"	•						•	
sub-beam	5' 2 5/8"	•	1.000		1.000		1.000		1.000
member	15' 8"	•						•	
sub-beam	4' 11"	•	1.000		1.000		1.000		1.000
support	20' 7"	•		•		•		•	

Static Design Summary

Summary W 16x26

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-12.7	106.0	kip	0.120	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	85.3	165.7	kip ft	0.515	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.024	-	in	-	-
Deflection Slab	2	0.404	1.029	in	0.393	✓ Pass
Deflection Dead	2	0.181	0.686	in	0.264	✓ Pass
Deflection Total	2	0.610	1.029	in	0.592	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 5' 2 5/8" - Critical

Moment, M_x = 64.6 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Position 20' 7" - Critical

Position of V_y = 20' 7" ft, in

Required major axis shear strength, V_y = 12.7 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.120

✓ Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Yielding: 10' 5 3/8" - Critical

Dist of M_{rx} along member = 10' 5 3/8" ft, in

Required flexural strength, M_{rx1} = 85.3 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.515

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 10' 4 3/8" ft, in

Max. Total load deflection = 0.610 in

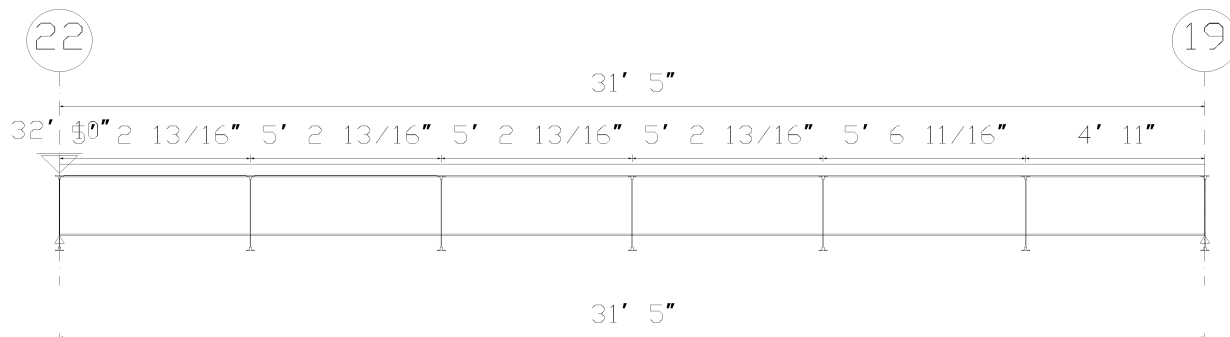
Span over limit = 1.029 in

Design limit = 1.029 in

Utilization Ratio = 0.592

✓ Pass

SB 2-3



Roof: SB 2-3 = 1 (W 21x44 A992-50)

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	5' 2 7/8"	•	1.000		1.000		1.000		1.000
member	5' 2 7/8"	•						•	
sub-beam	5' 2 7/8"	•	1.000		1.000		1.000		1.000
member	10' 5 5/8"	•						•	
sub-beam	5' 2 7/8"	•	1.000		1.000		1.000		1.000
member	15' 8 1/2"	•						•	
sub-beam	5' 2 7/8"	•	1.000		1.000		1.000		1.000
member	20' 11 3/8"	•						•	
sub-beam	5' 6 5/8"	•	1.000		1.000		1.000		1.000
member	26' 6"	•						•	
sub-beam	4' 11"	•	1.000		1.000		1.000		1.000
support	31' 5"	•		•		•		•	

Static Design Summary

Summary W 21x44

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-21.8	217.4	kip	0.100	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	201.4	357.7	kip ft	0.563	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.062	-	in	-	-
Deflection Slab	2	0.798	1.571	in	0.508	✓ Pass
Deflection Dead	2	0.358	1.047	in	0.342	✓ Pass
Deflection Total	4	1.218	1.571	in	0.775	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 21x44 A992-50 - Critical

Flexural: Position 5' 2 7/8" - Critical

Moment, M_x = 111.9 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 21x44 A992-50 - Critical

Position 31' 5" - Critical

Position of V_y = 31' 5" ft, in

Required major axis shear strength, V_y = -21.8 kip

Design shear strength =217.4 kip AISC 360 G2
Ratio =0.100

✓ Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 21x44 A992-50 - Critical

Yielding: 15' 8 1/2" - Critical

Dist of M_{rx} along member =15' 8 1/2" ft, in

Required flexural strength, M_{rx1} =201.4 kip ft

Design flexural strength =357.7 kip ft AISC 360 F1, F2 and F3

Ratio =0.563

✓ Pass

Deflection

1 Construction Stage - Critical

Span 1 W 21x44 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =15' 8 1/2" ft, in

Max. Total load deflection =1.218 in

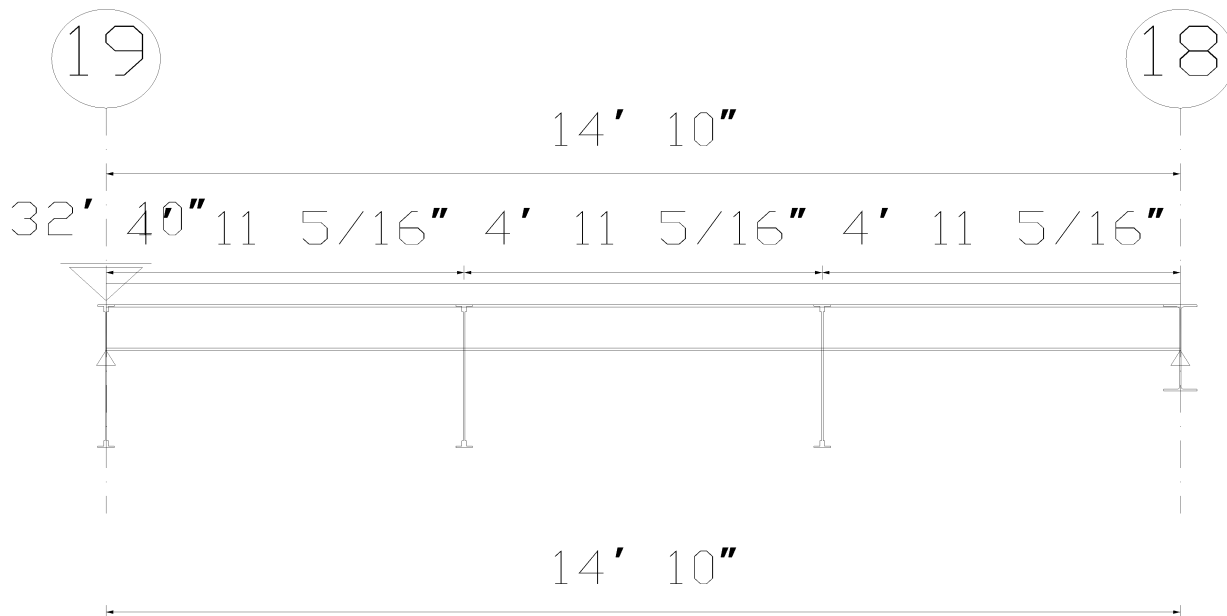
Span over limit =1.571 in

Design limit =1.571 in

Utilization Ratio =0.775

✓ Pass

SB 2-4



Roof: SB 2-4 - 1
W 8x21 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 11 3/8"	•	1.000		1.000		1.000		1.000
member	4' 11 3/8"	•						•	
sub-beam	4' 11 3/8"	•	1.000		1.000		1.000		1.000
member	9' 10 5/8"	•						•	
sub-beam	4' 11 3/8"	•	1.000		1.000		1.000		1.000
support	14' 10"	•		•		•		•	

Static Design Summary

Summary W 8x21

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-8.0	62.1	kip	0.129	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	39.3	76.5	kip ft	0.514	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.023	-	in	-	-
Deflection Slab	2	0.415	0.742	in	0.560	✓ Pass
Deflection Dead	2	0.186	0.494	in	0.377	✓ Pass
Deflection Total	1	0.625	0.742	in	0.842	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x21 A992-50 - Critical

Flexural: Position 4' 11 3/8" - Critical

Moment, M_x = 39.3 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 8x21 A992-50 - Critical

Position 14' 10" - Critical

Position of V_{ry} = 14' 10" ft, in

Required major axis shear strength, V_{ry} = -8.0 kip

Design shear strength = 62.1 kip AISC 360 G2

Ratio = 0.129



Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

Yielding: 7' 5" - Critical

Dist of M_{rx} along member = 7' 5" ft, in

Required flexural strength, M_{rx1} = 39.3 kip ft

Design flexural strength = 76.5 kip ft AISC 360 F1, F2 and F3

Ratio = 0.514

✓ Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x21 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 7' 5" ft, in

Max. Total load deflection = 0.625 in

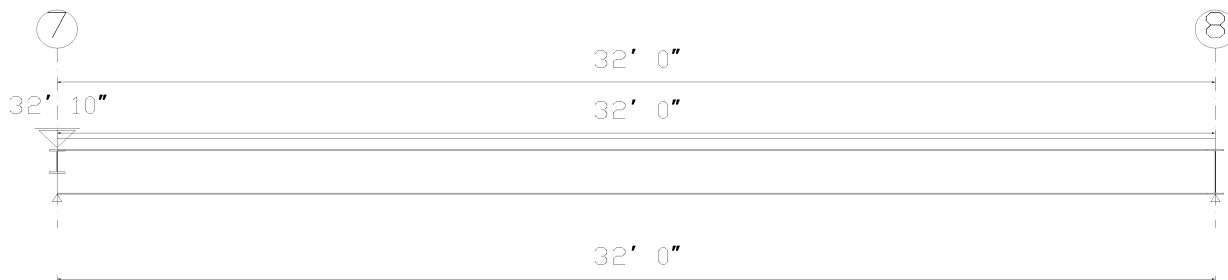
Span over limit = 0.742 in

Design limit = 0.742 in

Utilization Ratio = 0.842

✓ Pass

SB 2-5



Roof: SB 2-5 - 1 (W 16x26 A992-50)

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	32' 0"	•	1.000		1.000		1.000		1.000
support	32' 0"	•		•		•		•	

Static Design Summary

Summary W 16x26

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	4.3	106.0	kip	0.041	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	34.7	165.7	kip ft	0.209	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.072	-	in	-	-
Deflection Slab	2	0.377	1.600	in	0.236	✓ Pass
Deflection Dead	2	0.169	1.067	in	0.159	✓ Pass



Project

Structure

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App'd by

Date

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Total	1	0.618	1.600	in	0.386	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 16' 0" - Critical

Moment, M_x = 34.7 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 4.3 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.041

✓ Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Yielding: 16' 0" - Critical

Dist of M_{rx} along member = 16' 0" ft, in

Required flexural strength, M_{rx1} = 34.7 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.209

✓ Pass

Deflection

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 16' 0" ft, in

Max. Total load deflection = 0.618 in

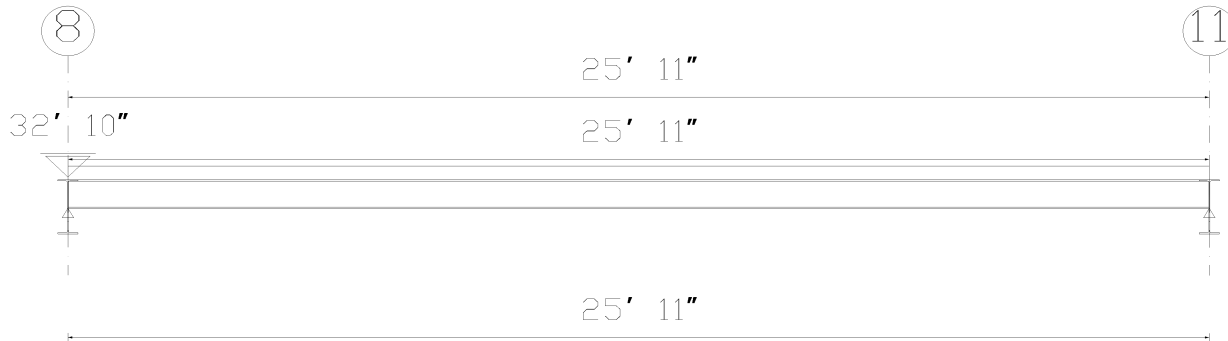
Span over limit = 1.600 in

Design limit = 1.600 in

Utilization Ratio = 0.386

✓ Pass

SB 2-6



Roof: SB 2-6 - 1 (W 8x21 A992-50)

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	25' 11"	•	1.000		1.000		1.000		1.000
support	25' 11"	•		•		•		•	

Static Design Summary

Summary W 8x21

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.4	62.1	kip	0.055	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	22.2	76.5	kip ft	0.290	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.098	-	in	-	-
Deflection Slab	2	0.646	1.296	in	0.499	✓ Pass
Deflection Dead	2	0.290	0.864	in	0.336	✓ Pass
Deflection Total	2	1.035	1.296	in	0.798	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x21 A992-50 - Critical

Flexural: Position 12' 11 1/2" - Critical

Moment, M_x = 22.2 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 8x21 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 3.4 kip

Design shear strength = 62.1 kip AISC 360 G2

Ratio = 0.055

✓ Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 8x21 A992-50 - Critical

Yielding: 12' 11 1/2" - Critical

Dist of M_{rx} along member = 12' 11 1/2" ft, in

Required flexural strength, M_{rx1} = 22.2 kip ft

Design flexural strength = 76.5 kip ft AISC 360 F1, F2 and F3

Ratio = 0.290

✓ Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x21 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 12' 11 1/2" ft, in

Max. Total load deflection = 1.035 in

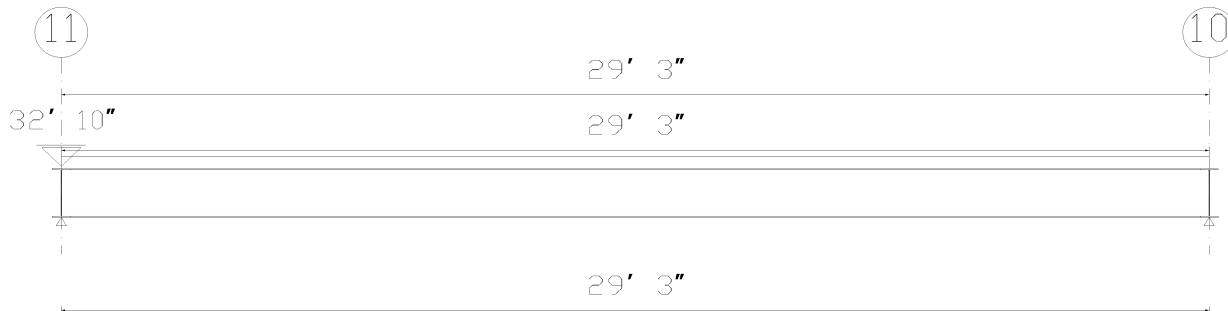
Span over limit = 1.296 in

Design limit = 1.296 in

Utilization Ratio = 0.798

✓ Pass

SB 2-7



Roof: SB 2-7 = 1 (W 16x26 A992-50)

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	29' 3"	•	1.000		1.000		1.000		1.000
support	29' 3"	•		•		•		•	

Static Design Summary

Summary W 16x26

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Shear Major	1	4.0	106.0	kip	0.037	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	29.0	165.7	kip ft	0.175	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.050	-	in	-	-
Deflection Slab	2	0.264	1.462	in	0.180	✓ Pass
Deflection Dead	2	0.118	0.975	in	0.121	✓ Pass
Deflection Total	1	0.432	1.462	in	0.296	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 14' 7 1/2" - Critical

Moment, M_x = 29.0 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 4.0 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.037

✓ Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Yielding: 14' 7 1/2" - Critical

Dist of M_{rx} along member = 14' 7 1/2" ft, in

Required flexural strength, M_{rx1} = 29.0 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.175

✓ Pass

Deflection

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 14' 7 1/2" ft, in

Max. Total load deflection = 0.432 in

Span over limit = 1.462 in

Design limit = 1.462 in

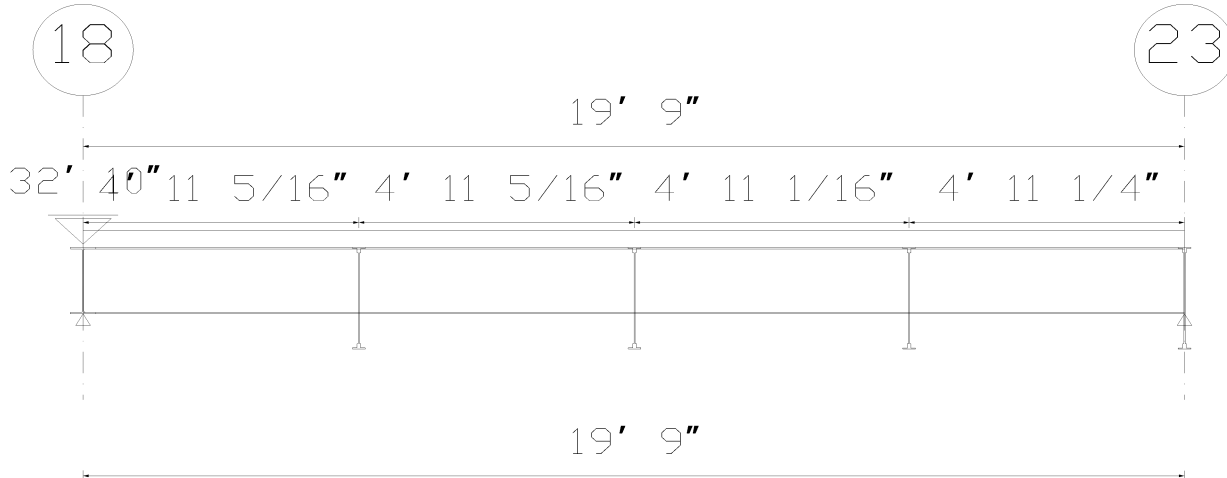
Utilization Ratio

=0.296



Pass

SB 2-8



Roof: SB 2-8 - 1
W 16x26 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 11 3/8"	•	1.000		1.000		1.000		1.000
member	4' 11 3/8"	•						•	
sub-beam	4' 11 3/8"	•	1.000		1.000		1.000		1.000
member	9' 10 5/8"	•						•	
sub-beam	4' 11 1/8"	•	1.000		1.000		1.000		1.000
member	14' 9 3/4"	•						•	
sub-beam	4' 11 1/4"	•	1.000		1.000		1.000		1.000
support	19' 9"	•		•		•		•	

Static Design Summary

Summary W 16x26

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	2	-11.0	106.0	kip	0.104	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	72.0	165.7	kip ft	0.434	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.020	-	in	-	-
Deflection Slab	2	0.315	0.987	in	0.319	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Dead	2	0.141	0.658	in	0.214	✓ Pass
Deflection Total	2	0.475	0.987	in	0.481	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 4' 11 3/8" - Critical

Moment, M_x = 54.0 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 19' 9" - Critical

Position of V_y = 19' 9" ft, in

Required major axis shear strength, V_y = 11.0 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.104

✓ Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Yielding: 9' 10 5/8" - Critical

Dist of M_{rx} along member = 9' 10 5/8" ft, in

Required flexural strength, M_{rx1} = 72.0 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.434

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 9' 10 5/8" ft, in

Max. Total load deflection = 0.475 in

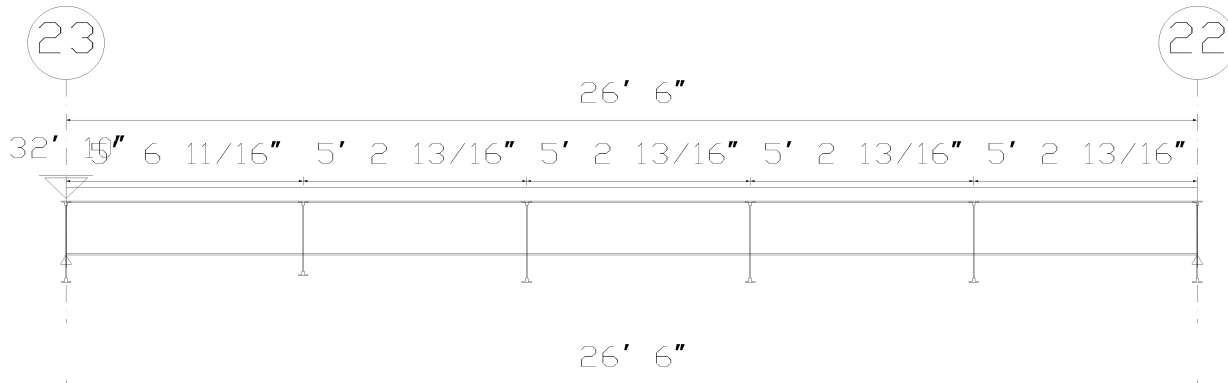
Span over limit = 0.987 in

Design limit = 0.987 in

Utilization Ratio = 0.481

✓ Pass

SB 2-9



Roof: SB 2-9 - 1 (W 16x31 A992-50)

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	5' 6 5/8"	•	1.000		1.000		1.000		1.000
member	5' 6 5/8"	•						•	
sub-beam	5' 2 7/8"	•	1.000		1.000		1.000		1.000
member	10' 9 1/2"	•						•	
sub-beam	5' 2 7/8"	•	1.000		1.000		1.000		1.000
member	16' 3/8"	•						•	
sub-beam	5' 2 7/8"	•	1.000		1.000		1.000		1.000
member	21' 3 1/8"	•						•	
sub-beam	5' 2 7/8"	•	1.000		1.000		1.000		1.000
support	26' 6"	•		•		•		•	

Static Design Summary

Summary W 16x31

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-15.8	131.2	kip	0.121	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	125.4	202.5	kip ft	0.619	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.054	-	in	-	-
Deflection Slab	2	0.822	1.325	in	0.620	✓ Pass
Deflection Dead	2	0.369	0.883	in	0.417	✓ Pass
Deflection Total	2	1.245	1.325	in	0.939	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical



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Span 1 W 16x31 A992-50 - Critical

Flexural: Position 5' 6 5/8" - Critical

Moment, M_x = 86.1 kip ftElastic modulus of steel, E = 29000 ksiMinimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 16x31 A992-50 - Critical

Position 26' 6" - Critical

Position of V_{ry} = 26' 6" ft, inRequired major axis shear strength, V_{ry} = 15.8 kip

Design shear strength = 131.2 kip AISC 360 G2

Ratio = 0.121

Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

Yielding: 10' 9 1/2" - Critical

Dist of M_{rx} along member = 10' 9 1/2" ft, inRequired flexural strength, M_{rx1} = 125.4 kip ft

Design flexural strength = 202.5 kip ft AISC 360 F1, F2 and F3

Ratio = 0.619

Pass

Deflection

1 Construction Stage - Critical

Span 1 W 16x31 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 13' 3" ft, in

Max. Total load deflection = 1.245 in

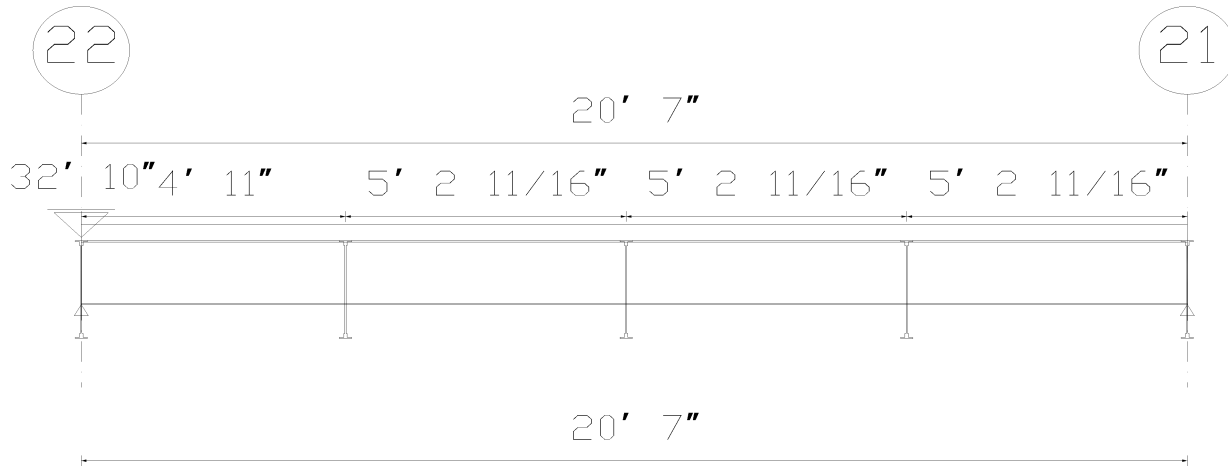
Span over limit = 1.325 in

Design limit = 1.325 in

Utilization Ratio = 0.939

Pass

SB 2-10



Roof: SB 2-10 - 1
W 16x26 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 11"	•	1.000		1.000		1.000		1.000
member	4' 11"	•						•	
sub-beam	5' 2 5/8"	•	1.000		1.000		1.000		1.000
member	10' 1 5/8"	•						•	
sub-beam	5' 2 5/8"	•	1.000		1.000		1.000		1.000
member	15' 4 3/8"	•						•	
sub-beam	5' 2 5/8"	•	1.000		1.000		1.000		1.000
support	20' 7"	•		•		•		•	

Static Design Summary

Summary W 16x26

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	11.6	106.0	kip	0.110	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	78.1	165.7	kip ft	0.471	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.022	-	in	-	-
Deflection Slab	2	0.370	1.029	in	0.359	✓ Pass
Deflection Dead	2	0.166	0.686	in	0.242	✓ Pass
Deflection Total	2	0.558	1.029	in	0.542	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations



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Classification

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 4' 11" - Critical

Moment, M_x = 56.8 kip ftElastic modulus of steel, E = 29000 ksiMinimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_y = 0" ft, inRequired major axis shear strength, V_y = 11.6 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.110

✓ Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Yielding: 10' 1 5/8" - Critical

Dist of M_{rx} along member = 10' 1 5/8" ft, inRequired flexural strength, M_{rx1} = 78.1 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.471

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 10' 2 5/8" ft, in

Max. Total load deflection = 0.558 in

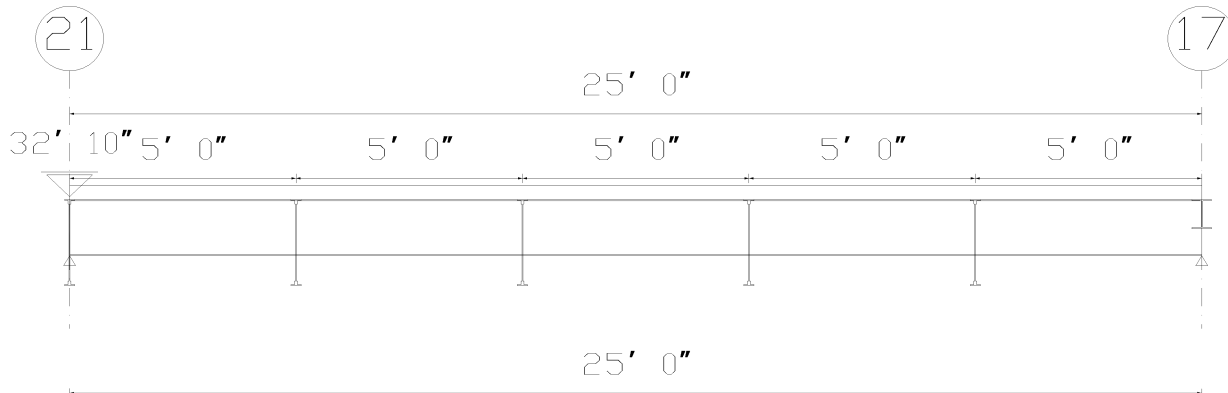
Span over limit = 1.029 in

Design limit = 1.029 in

Utilization Ratio = 0.542

✓ Pass

SB 2-11



Roof: SB 2-11 - 1 (W 16x26 A992-50)

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
member	5' 0"	•						•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
member	10' 0"	•						•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
member	15' 0"	•						•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
member	20' 0"	•						•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
support	25' 0"	•		•		•		•	

Static Design Summary

Summary W 16x26

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	2	-14.8	106.0	kip	0.140	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	110.7	165.7	kip ft	0.668	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.050	-	in	-	-
Deflection Slab	2	0.811	1.250	in	0.648	✓ Pass
Deflection Dead	2	0.364	0.833	in	0.437	✓ Pass
Deflection Total	1	1.224	1.250	in	0.979	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical



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Span 1 W 16x26 A992-50 - Critical

Flexural: Position 5' 0" - Critical

Moment, M_x = 73.8 kip ftElastic modulus of steel, E = 29000 ksiMinimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 25' 0" - Critical

Position of V_{ry} = 25' 0" ft, inRequired major axis shear strength, V_{ry} = 14.8 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.140



Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Yielding: 12' 6" - Critical

Dist of M_{rx} along member = 12' 6" ft, inRequired flexural strength, M_{rx1} = 110.7 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.668



Pass

Deflection

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 12' 6" ft, in

Max. Total load deflection = 1.224 in

Span over limit = 1.250 in

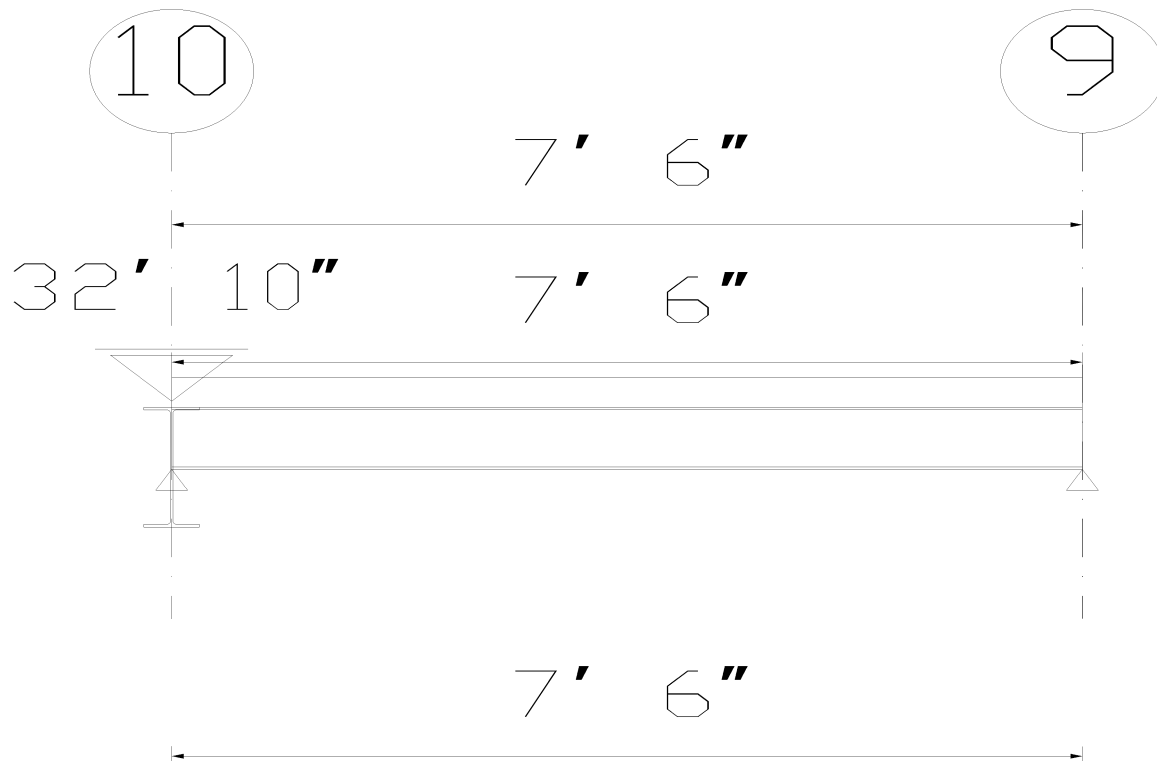
Design limit = 1.250 in

Utilization Ratio = 0.979



Pass

SB 2-12



Roof: SB 2-12 - 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	7' 6"	•	1.000		1.000		1.000		1.000
support	7' 6"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	1.0	56.2	kip	0.018	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	1.9	63.7	kip ft	0.029	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.001	-	in	-	-
Deflection Slab	2	0.006	0.375	in	0.016	✓ Pass
Deflection Dead	2	0.003	0.250	in	0.011	✓ Pass
Deflection Total	1	0.010	0.375	in	0.026	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 3' 9" - Critical

Moment, M_x = 1.9 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 1.0 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.018

✓ Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 3' 9" - Critical

Dist of M_{rx} along member = 3' 9" ft, in

Required flexural strength, M_{rx1} = 1.9 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.029

✓ Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 3' 9" ft, in

Max. Total load deflection = 0.010 in

Span over limit = 0.375 in

Design limit = 0.375 in

Utilization Ratio = 0.026

✓ Pass

SB 2-13



Roof: SB 2-13 - 1 (W 16x26 A992-50)

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	9' 0"	•	1.000		1.000		1.000		1.000
member	9' 0"					•			
sub-beam	12' 9"	•	1.000		1.000		1.000		1.000
support	21' 9"	•		•		•		•	

Static Design Summary

Summary W 16x26

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	9.6	106.0	kip	0.090	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	75.0	165.7	kip ft	0.452	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.035	-	in	-	-
Deflection Slab	2	0.456	1.087	in	0.419	✓ Pass
Deflection Dead	2	0.037	0.725	in	0.051	✓ Pass
Deflection Total	2	0.528	1.087	in	0.486	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 9' 0" - Critical

Moment, M_x = 75.0 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 9.6 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.090



Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Yielding: 9' 0" - Critical

Dist of M_{rx} along member = 9' 0" ft, in

Required flexural strength, M_{rx1} = 75.0 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.452



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 10' 4 1/4" ft, in

Max. Total load deflection = 0.528 in

Span over limit = 1.087 in

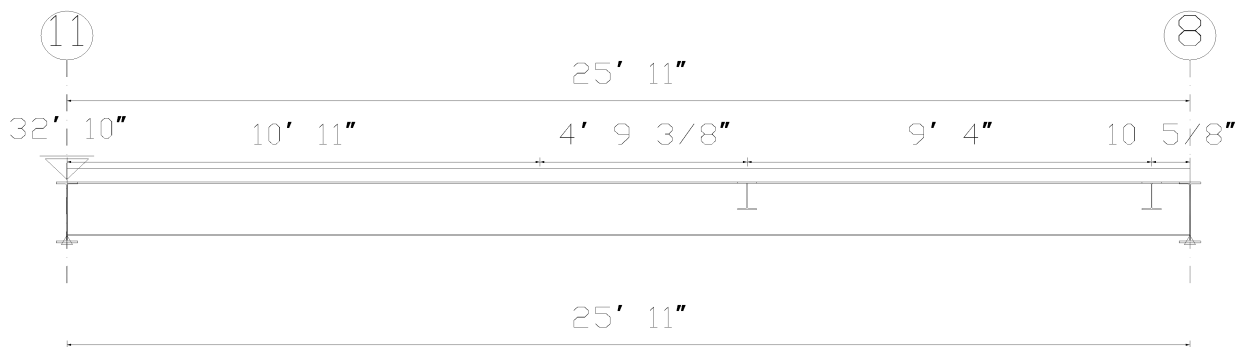
Design limit = 1.087 in

Utilization Ratio = 0.486



Pass

SB 2-15



Roof: SB 2-15 = 1 (W 16x26 A992-50)

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	10' 11"	•	1.000		1.000		1.000		1.000

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
member	10' 11"					•			
sub-beam	4' 9 3/8"	•	1.000		1.000		1.000		1.000
member	15' 8 3/8"	•						•	
sub-beam	9' 4"	•	1.000		1.000		1.000		1.000
member	25' 3/8"	•						•	
sub-beam	10 5/8"	•	1.000		1.000		1.000		1.000
support	25' 11"	•		•		•		•	

Static Design Summary

Summary W 16x26

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	11.3	106.0	kip	0.106	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	106.6	165.7	kip ft	0.643	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.068	-	in	-	-
Deflection Slab	2	0.915	1.296	in	0.706	✓ Pass
Deflection Dead	2	0.074	0.864	in	0.086	✓ Pass
Deflection Total	2	1.057	1.296	in	0.815	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 10' 11" - Critical

Moment, M_x = 106.6 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 11.3 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.106



Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Yielding: 10' 11" - Critical

Dist of M_{rx} along member = 10' 11" ft, in
Required flexural strength, M_{rx1} = 106.6 kip ft
Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3
Ratio = 0.643

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 12' 4 7/8" ft, in

Max. Total load deflection = 1.057 in

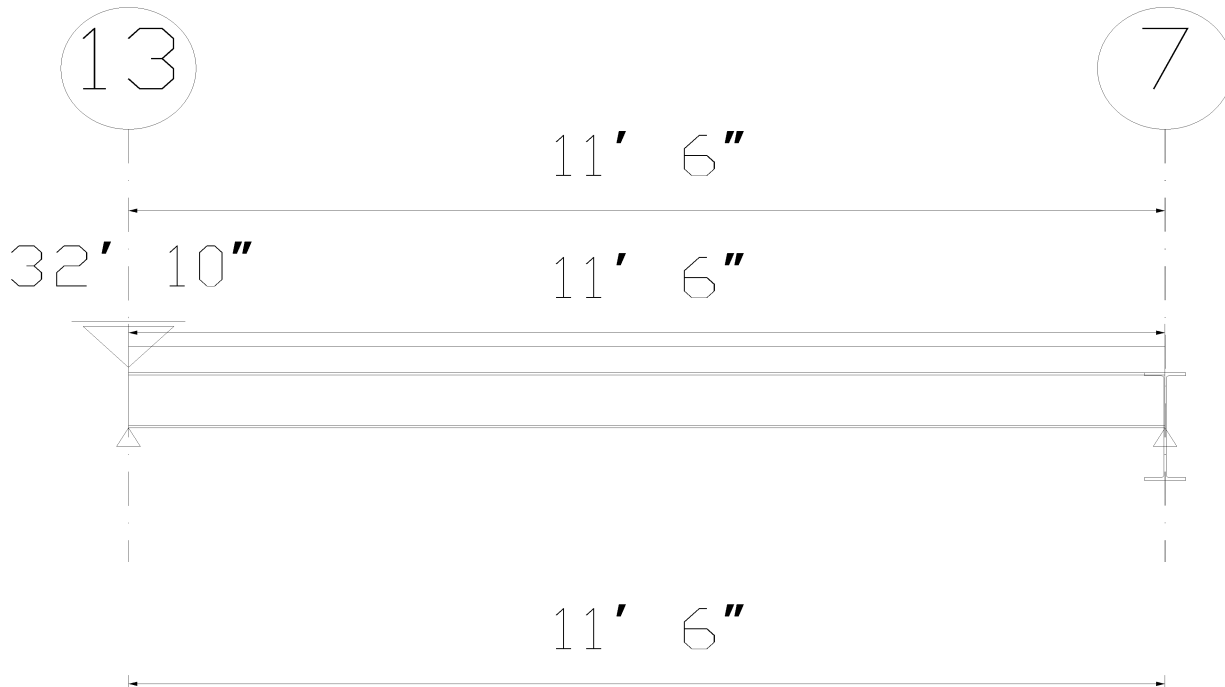
Span over limit = 1.296 in

Design limit = 1.296 in

Utilization Ratio = 0.815

✓ Pass

SB 2-16



Roof: SB 2-16 = 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	11' 6"	•	1.000		1.000		1.000		1.000

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	11' 6"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	1.5	56.2	kip	0.027	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	4.4	63.7	kip ft	0.068	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.004	-	in	-	-
Deflection Slab	2	0.032	0.575	in	0.055	✓ Pass
Deflection Dead	2	0.014	0.383	in	0.037	✓ Pass
Deflection Total	1	0.050	0.575	in	0.087	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 5' 9" - Critical

Moment, M_x = 4.4 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 1.5 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.027

✓ Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 5' 9" - Critical

Dist of M_{rx} along member = 5' 9" ft, in

Required flexural strength, M_{rx1} = 4.4 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.068

✓ Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =5' 9" ft, in

Max. Total load deflection =0.050 in

Span over limit =0.575 in

Design limit =0.575 in

Utilization Ratio =**0.087**

✓ Pass

SB 2-17



Roof: SB 2-17 - 1
W 16x26 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	8' 0"	•	1.000		1.000		1.000		1.000
member	8' 0"					•			
sub-beam	12' 6"	•	1.000		1.000		1.000		1.000
support	20' 6"	•		•		•		•	

Static Design Summary

Summary W 16x26

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	2	9.2	106.0	kip	0.087	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	65.2	165.7	kip ft	0.393	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Self weight	1	0.027	-	in	-	-
Deflection Slab	2	0.354	1.025	in	0.345	✓ Pass
Deflection Dead	2	0.029	0.683	in	0.043	✓ Pass
Deflection Total	4	0.410	1.025	in	0.400	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 8' 0" - Critical

Moment, M_x = 65.2 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 9.2 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = **0.087**

✓ Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Yielding: 8' 0" - Critical

Dist of M_{rx} along member = 8' 0" ft, in

Required flexural strength, M_{rx1} = 65.2 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = **0.393**

✓ Pass

Deflection

4 LRFD_{6,1}-1.2D+L+1.6S - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 9' 8" ft, in

Max. Total load deflection = 0.410 in

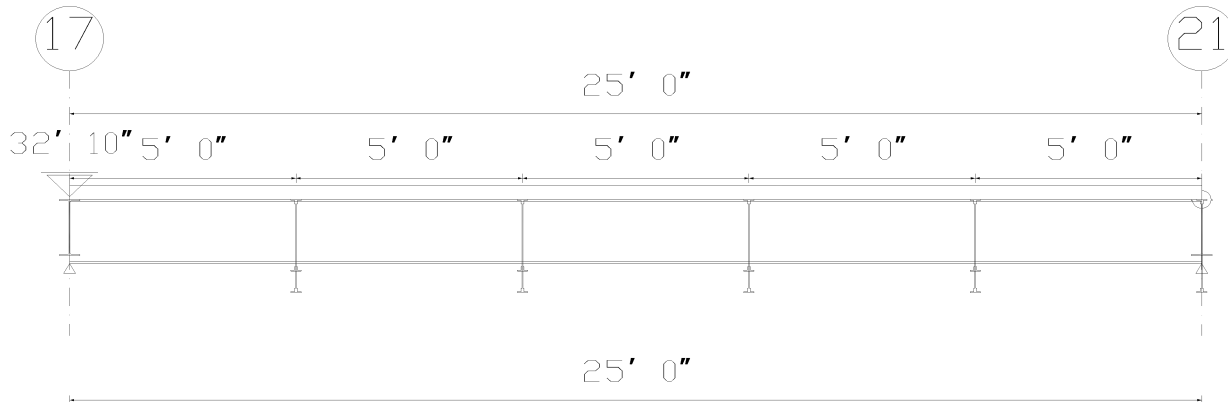
Span over limit = 1.025 in

Design limit = 1.025 in

Utilization Ratio = **0.400**

✓ Pass

SB 2-18



Roof: SB 2-18 - 1 (W 18x40 A992-50)

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
member	5' 0"	•						•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
member	10' 0"	•						•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
member	15' 0"	•						•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
member	20' 0"	•						•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
support	25' 0"	•		•		•		•	

Static Design Summary

Summary W 18x40

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-29.2	169.2	kip	0.173	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	218.1	294.0	kip ft	0.742	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.042	-	in	-	-
Deflection Slab	2	0.796	1.250	in	0.637	✓ Pass
Deflection Dead	2	0.357	0.833	in	0.429	✓ Pass
Deflection Total	1	1.196	1.250	in	0.957	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification



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1 Construction Stage - Critical

Span 1 W 18x40 A992-50 - Critical

Flexural: Position 5' 0" - Critical

Moment, M_x =145.3 kip ftElastic modulus of steel, E =29000 ksiMinimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major**1 Construction Stage - Critical**

Span 1 W 18x40 A992-50 - Critical

Position 25' 0" - Critical

Position of V_y =25' 0" ft, inRequired major axis shear strength, V_y =-29.2 kip

Design shear strength =169.2 kip AISC 360 G2

Ratio =0.173

Pass

Flexure Major**2 LRFD₂-1.2D+1.6L - Critical**

Span 1 W 18x40 A992-50 - Critical

Yielding: 12' 6" - Critical

Dist of M_{rx} along member =12' 6" ft, inRequired flexural strength, M_{rx1} =218.1 kip ft

Design flexural strength =294.0 kip ft AISC 360 F1, F2 and F3

Ratio =0.742

Pass

Deflection**1 Construction Stage - Critical**

Span 1 W 18x40 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =12' 6" ft, in

Max. Total load deflection =1.196 in

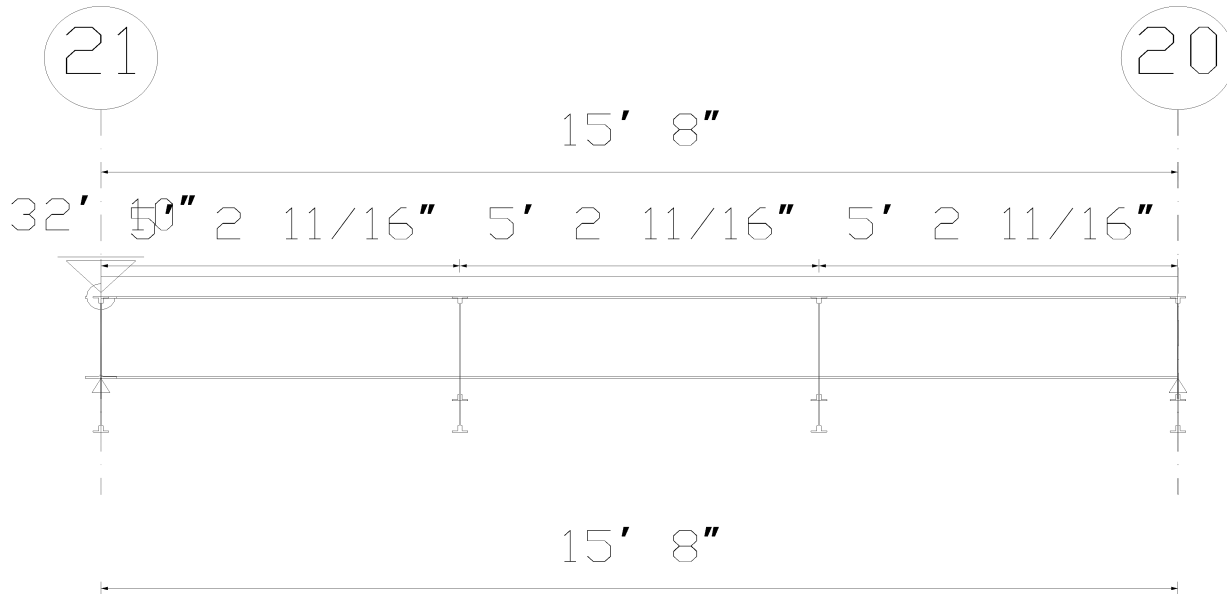
Span over limit =1.250 in

Design limit =1.250 in

Utilization Ratio =0.957

Pass

SB 2-19



Roof: SB 2-19 - 1
W 16x26 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	5' 2 5/8"	•	1.000		1.000		1.000	•	1.000
member	5' 2 5/8"	•						•	
sub-beam	5' 2 5/8"	•	1.000		1.000		1.000		1.000
member	10' 5 3/8"	•						•	
sub-beam	5' 2 5/8"	•	1.000		1.000		1.000		1.000
support	15' 8"	•		•		•		•	

Static Design Summary

Summary W 16x26

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	2	-15.2	106.0	kip	0.143	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	78.8	165.7	kip ft	0.476	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.011	-	in	-	-
Deflection Slab	2	0.240	0.783	in	0.306	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Dead	2	0.108	0.522	in	0.206	✓ Pass
Deflection Total	2	0.358	0.783	in	0.457	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 5' 2 5/8" - Critical

Moment, M_x = 78.7 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 15' 8" - Critical

Position of V_{ry} = 15' 8" ft, in

Required major axis shear strength, V_{ry} = 15.2 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.143



Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Yielding: 7' 9 3/4" - Critical

Dist of M_{rx} along member = 7' 9 3/4" ft, in

Required flexural strength, M_{rx1} = 78.8 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.476



Pass

Deflection

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 7' 10" ft, in

Max. Total load deflection = 0.358 in

Span over limit = 0.783 in

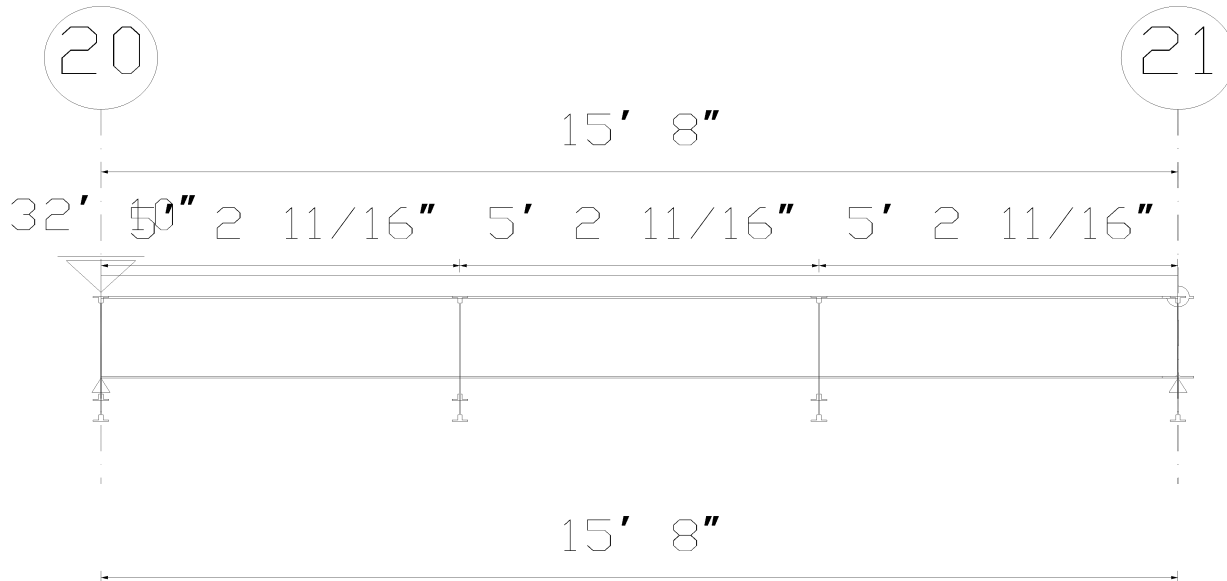
Design limit = 0.783 in

Utilization Ratio = 0.457



Pass

SB 2-23



Roof: SB 2-23 - 1
W 16x26 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	5' 2 5/8"	•	1.000		1.000		1.000		1.000
member	5' 2 5/8"	•						•	
sub-beam	5' 2 5/8"	•	1.000		1.000		1.000		1.000
member	10' 5 3/8"	•						•	
sub-beam	5' 2 5/8"	•	1.000		1.000		1.000		1.000
support	15' 8"	•		•		•		•	

Static Design Summary

Summary W 16x26

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	14.4	106.0	kip	0.136	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	75.1	165.7	kip ft	0.453	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.010	-	in	-	-
Deflection Slab	2	0.228	0.783	in	0.291	✓ Pass
Deflection Dead	2	0.102	0.522	in	0.196	✓ Pass



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Total	2	0.341	0.783	in	0.435	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 5' 2 5/8" - Critical

Moment, M_x =75.0 kip ftElastic modulus of steel, E =29000 ksiMinimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =14.4 kip

Design shear strength =106.0 kip AISC 360 G2

Ratio =0.136

✓ Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Yielding: 7' 10 1/8" - Critical

Dist of M_{rx} along member =7' 10 1/8" ft, inRequired flexural strength, M_{rx1} =75.1 kip ft

Design flexural strength =165.7 kip ft AISC 360 F1, F2 and F3

Ratio =0.453

✓ Pass

Deflection

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =7' 10" ft, in

Max. Total load deflection =0.341 in

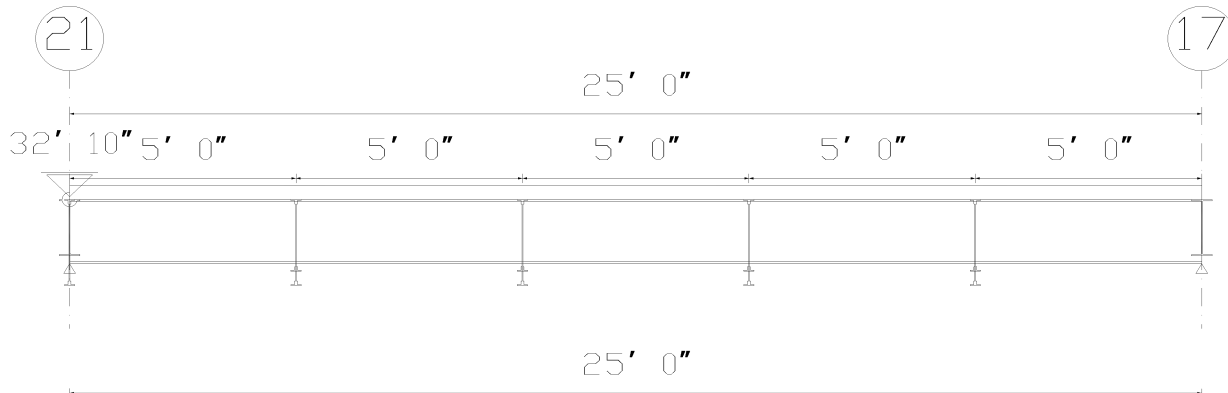
Span over limit =0.783 in

Design limit =0.783 in

Utilization Ratio =0.435

✓ Pass

SB 2-24



Roof: SB 2-24 - 1 (W 18x40 A992-50)

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
member	5' 0"	•						•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
member	10' 0"	•						•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
member	15' 0"	•						•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
member	20' 0"	•						•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
support	25' 0"	•		•		•		•	

Static Design Summary

Summary W 18x40

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	2	27.8	169.2	kip	0.164	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	207.9	294.0	kip ft	0.707	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.041	-	in	-	-
Deflection Slab	2	0.758	1.250	in	0.607	✓ Pass
Deflection Dead	2	0.340	0.833	in	0.408	✓ Pass
Deflection Total	2	1.140	1.250	in	0.912	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 18x40 A992-50 - Critical

Flexural: Position 5' 0" - Critical

Moment, M_x = 138.5 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 27.8 kip

Design shear strength = 169.2 kip AISC 360 G2

Ratio = 0.164

✓ Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

Yielding: 12' 6" - Critical

Dist of M_{rx} along member = 12' 6" ft, in

Required flexural strength, M_{rx1} = 207.9 kip ft

Design flexural strength = 294.0 kip ft AISC 360 F1, F2 and F3

Ratio = 0.707

✓ Pass

Deflection

1 Construction Stage - Critical

Span 1 W 18x40 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 12' 6" ft, in

Max. Total load deflection = 1.140 in

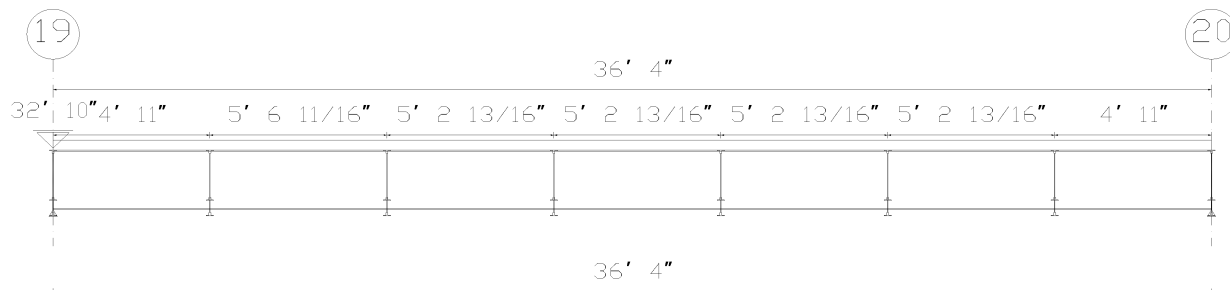
Span over limit = 1.250 in

Design limit = 1.250 in

Utilization Ratio = 0.912

✓ Pass

SB 2-27



Roof: SB 2-27 = 1 (W 24x55 A992-50)

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 11"	•	1.000		1.000		1.000		1.000
member	4' 11"	•						•	
sub-beam	5' 6 5/8"	•	1.000		1.000		1.000		1.000
member	10' 5 5/8"	•						•	
sub-beam	5' 2 7/8"	•	1.000		1.000		1.000		1.000
member	15' 8 1/2"	•						•	
sub-beam	5' 2 7/8"	•	1.000		1.000		1.000		1.000
member	20' 11 3/8"	•						•	
sub-beam	5' 2 7/8"	•	1.000		1.000		1.000		1.000
member	26' 2 1/8"	•						•	
sub-beam	5' 2 7/8"	•	1.000		1.000		1.000		1.000
member	31' 5"	•						•	
sub-beam	4' 11"	•	1.000		1.000		1.000		1.000
support	36' 4"	•		•		•		•	

Static Design Summary

Summary W 24x55

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-46.1	251.7	kip	0.183	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	473.3	502.5	kip ft	0.942	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.099	-	in	-	-
Deflection Slab	2	1.619	1.817	in	0.891	✓ Pass
Deflection Dead	2	0.726	1.211	in	0.600	✓ Pass
Deflection Total	2	2.444	1.817	in	1.345	✗ Fail

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 24x55 A992-50 - Critical

Flexural: Position 4' 11" - Critical

Moment, M_x = 225.6 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 24x55 A992-50 - Critical

Position 36' 4" - Critical

Position of V_{ry} = 36' 4" ft, in

Required major axis shear strength, V_{ry} = -46.1 kip

Design shear strength = 251.7 kip AISC 360 G2

Ratio = 0.183



Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 24x55 A992-50 - Critical

Yielding: 15' 8 1/2" - Critical

Dist of M_{rx} along member = 15' 8 1/2" ft, in

Required flexural strength, M_{rx1} = 473.3 kip ft

Design flexural strength = 502.5 kip ft AISC 360 F1, F2 and F3

Ratio = 0.942



Pass

Deflection

1 Construction Stage - Critical

Span 1 W 24x55 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 18' 2" ft, in

Max. Total load deflection = 2.444 in

Span over limit = 1.817 in

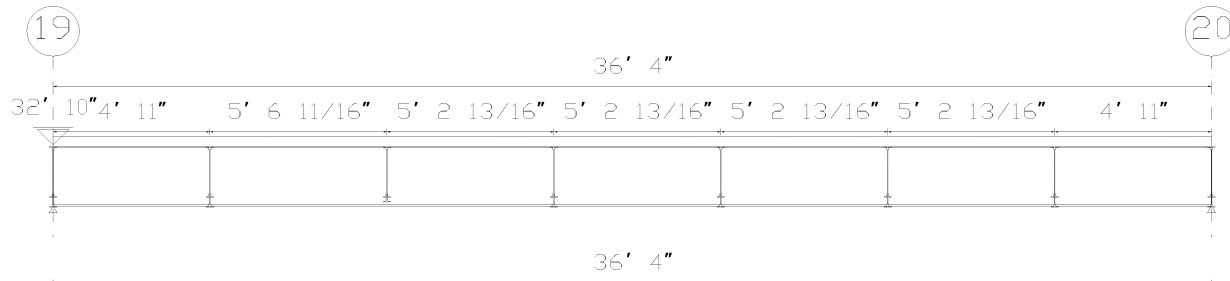
Design limit = 1.817 in

Utilization Ratio = 1.345



Fail

SB 2-28



Roof: SB 2-28 = 1 (W 24x55 A992-50)

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 11"	•	1.000		1.000		1.000		1.000
member	4' 11"	•						•	
sub-beam	5' 6 5/8"	•	1.000		1.000		1.000		1.000
member	10' 5 5/8"	•						•	
sub-beam	5' 2 7/8"	•	1.000		1.000		1.000		1.000
member	15' 8 1/2"	•						•	
sub-beam	5' 2 7/8"	•	1.000		1.000		1.000		1.000
member	20' 11 3/8"	•						•	
sub-beam	5' 2 7/8"	•	1.000		1.000		1.000		1.000
member	26' 2 1/8"	•						•	
sub-beam	5' 2 7/8"	•	1.000		1.000		1.000		1.000

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
member	31' 5"	•						•	
sub-beam	4' 11"	•	1.000		1.000		1.000		1.000
support	36' 4"	•		•		•		•	

Static Design Summary

Summary W 24x55

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-43.9	251.7	kip	0.174	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	451.1	502.5	kip ft	0.898	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.096	-	in	-	-
Deflection Slab	2	1.542	1.817	in	0.849	✓ Pass
Deflection Dead	2	0.692	1.211	in	0.571	✓ Pass
Deflection Total	4	2.329	1.817	in	1.282	✗ Fail

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 24x55 A992-50 - Critical

Flexural: Position 4' 11" - Critical

Moment, M_x = 215.1 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 24x55 A992-50 - Critical

Position 36' 4" - Critical

Position of V_{ry} = 36' 4" ft, in

Required major axis shear strength, V_{ry} = -43.9 kip

Design shear strength = 251.7 kip AISC 360 G2

Ratio = 0.174



Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 24x55 A992-50 - Critical

Yielding: 15' 8 1/2" - Critical

Dist of M_{rx} along member = 15' 8 1/2" ft, in

Required flexural strength, M_{rx1} = 451.1 kip ft

Design flexural strength = 502.5 kip ft AISC 360 F1, F2 and F3

Ratio =0.898

Pass

Deflection

1 Construction Stage - Critical

Span 1 W 24x55 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =18' 2" ft, in

Max. Total load deflection =2.329 in

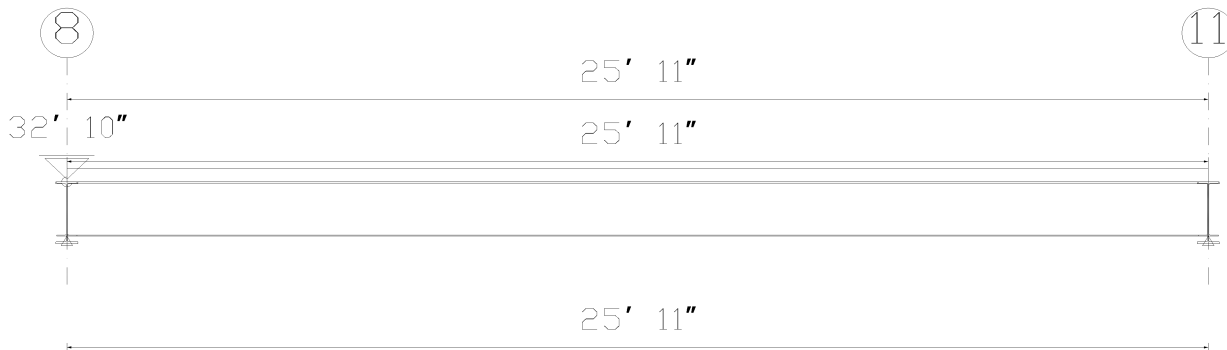
Span over limit =1.817 in

Design limit =1.817 in

Utilization Ratio =1.282

Fail

SB 2-29



Roof: SB 2-29 = 1 (W 16x26 A992-50)

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	25' 11"	•	1.000		1.000		1.000		1.000
support	25' 11"	•		•		•		•	

Static Design Summary

Summary W 16x26

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	Pass
Shear Major	1	6.8	106.0	kip	0.064	Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	44.2	165.7	kip ft	0.267	Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.031	-	in	-	-
Deflection Slab	2	0.338	1.296	in	0.261	Pass
Deflection Dead	2	0.152	0.864	in	0.175	Pass
Deflection Total	2	0.520	1.296	in	0.401	Pass



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Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 12' 11 1/2" - Critical

Moment, M_x = 44.2 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 6.8 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.064



Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Yielding: 12' 11 1/2" - Critical

Dist of M_{rx} along member = 12' 11 1/2" ft, in

Required flexural strength, M_{rx1} = 44.2 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.267



Pass

Deflection

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 12' 11 1/2" ft, in

Max. Total load deflection = 0.520 in

Span over limit = 1.296 in

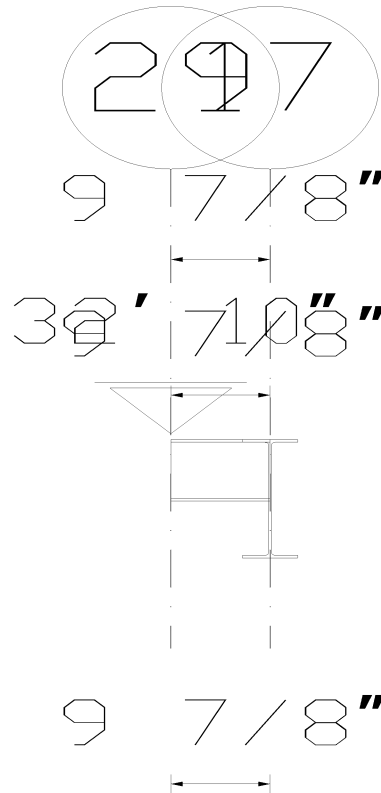
Design limit = 1.296 in

Utilization Ratio = 0.401



Pass

SB 2-44



Roof: SB 2-44 - 1
 W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	9' 7/8"	•	1.000		1.000		1.000		1.000
support	9' 7/8"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification		Unknown	-	-	-	Not required
Shear Major		No Significant Forces		kip	-	Not required
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major		No Significant Forces		kip ft	-	Not required
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension	1	-1.0	236.7	kip	0.004	✓ Pass
Axial Compression		No Significant Forces		kip	-	Not required



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Axial Tension

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: Position 0" - Critical

Distance of P_r along member =0" ft, in

Required tensile strength, P_r =-1.0 kip

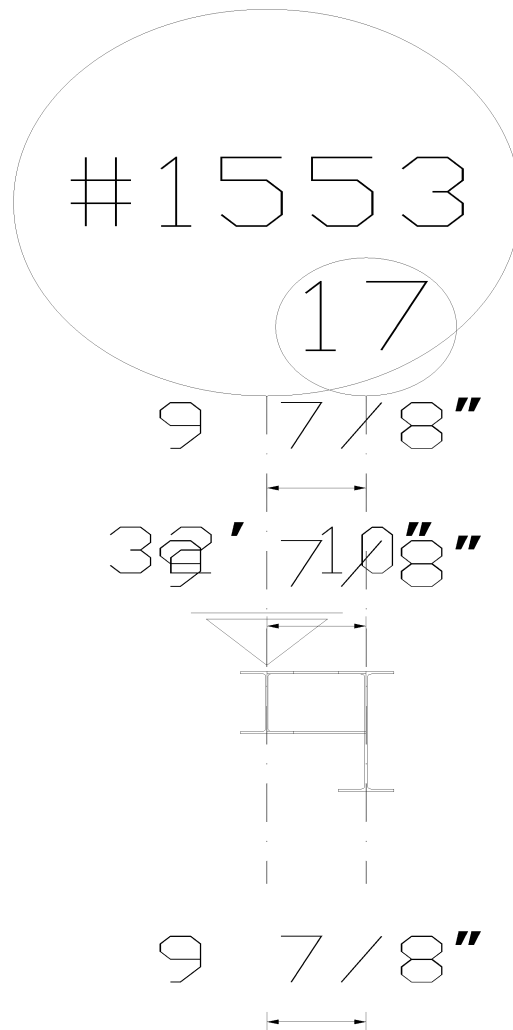
Design yield strength =236.7 kip AISC 360 D2

Ratio =**0.004**



Pass

SB 2-45



Roof: SB 2-45 = 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	9 7/8"	•	1.000		1.000		1.000		1.000
support	9 7/8"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Flexural Classification		Unknown	-	-	-	Not required
Shear Major		No Significant Forces		kip	-	Not required
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major		No Significant Forces		kip ft	-	Not required
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension	2	-1.4	236.7	kip	0.006	✓ Pass
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Axial Tension

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: Position 0" - Critical

Distance of P_r along member =0" ft, in

Required tensile strength, P_r =-1.4 kip

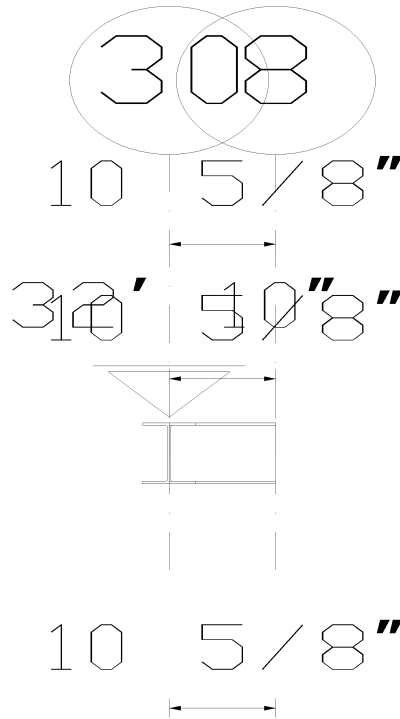
Design yield strength =236.7 kip AISC 360 D2

Ratio =0.006



Pass

SB 2-46



Roof: SB 2-46 - 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	10 5/8"	•	1.000		1.000		1.000		1.000
support	10 5/8"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification		Unknown	-	-	-	Not required
Shear Major		No Significant Forces		kip	-	Not required
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major		No Significant Forces		kip ft	-	Not required
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension	2	-1.4	236.7	kip	0.006	✓ Pass
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Axial Tension

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: Position 0" - Critical

Distance of P_r along member = 0" ft, in

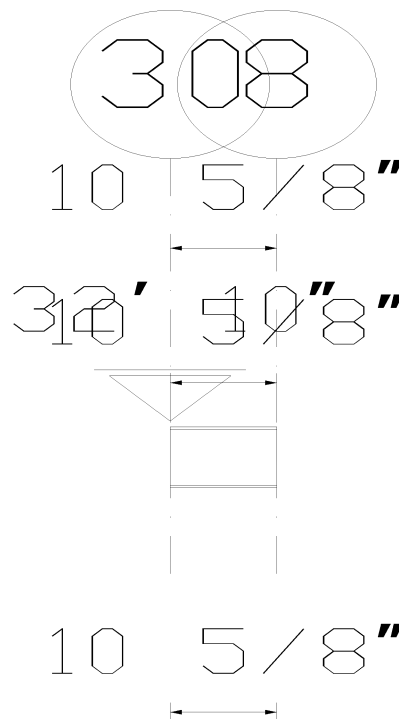
Required tensile strength, P_r = 1.4 kip

Design yield strength = 236.7 kip AISC 360 D2

Ratio = 0.006

✓ Pass

SB 2-47



Roof: SB 2-47 - 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	10 5/8"	•	1.000		1.000		1.000		1.000
support	10 5/8"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification		Unknown	-	-	-	Not required
Shear Major		No Significant Forces		kip	-	Not required
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major		No Significant Forces		kip ft	-	Not required
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression	2	0.2	235.4	kip	0.001	✓ Pass
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Axial: Position 0" - Critical

Axial Force, P =0.1 kip

Elastic modulus of steel, E =29000 ksi

Minimum yield stress, F_y =50.00 ksi

Axial section class Non-slender AISC 360 Table B4.1a

Axial Compression

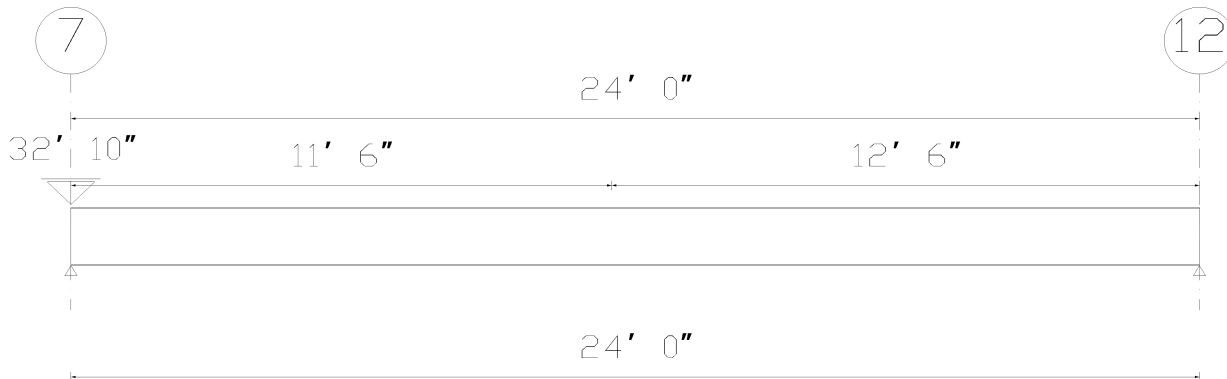
2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural - out-of-plane: 0" - 10 5/8" - Critical

Start - End	Mode	Length	Value	Limit	Units	Ratio	Status
0" - 10 5/8"	Flexural - out-of-plane	10 5/8"	0.2	235.4	kip	0.001	✓ Pass

SB 2-48



Roof: SB 2-48 - 1 (W 16x26 A992-50)

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	11' 6"	•	1.000		1.000		1.000		1.000
member	11' 6"					•			

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
sub-beam	12' 6"	•	1.000		1.000		1.000		1.000
support	24' 0"	•		•		•		•	

Static Design Summary

Summary W 16x26

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	2	6.8	106.0	kip	0.064	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	76.2	165.7	kip ft	0.460	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.051	-	in	-	-
Deflection Slab	2	0.573	1.200	in	0.478	✓ Pass
Deflection Total	2	0.624	1.200	in	0.520	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 11' 6" - Critical

Moment, M_x = 76.2 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 6.8 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.064



Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Yielding: 11' 6" - Critical

Dist of M_{rx} along member = 11' 6" ft, in

Required flexural strength, M_{rx1} = 76.2 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.460



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =11' 8 3/4" ft, in

Max. Total load deflection =0.624 in

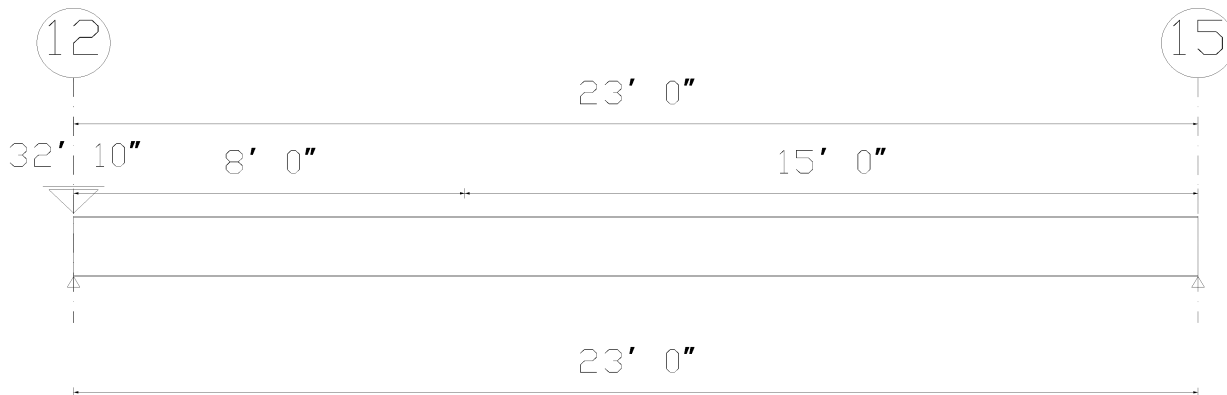
Span over limit =1.200 in

Design limit =1.200 in

Utilization Ratio =0.520

✓ Pass

SB 2-49



Roof: SB 2-49 - 1 (W 16x26 A992-50)

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	8' 0"	•	1.000		1.000		1.000		1.000
member	8' 0"					•			
sub-beam	15' 0"	•	1.000		1.000		1.000		1.000
support	23' 0"	•		•		•		•	

Static Design Summary

Summary W 16x26

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	0.4	106.0	kip	0.003	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	2.1	165.7	kip ft	0.013	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.019	-	in	-	-
Deflection Total	1	0.019	1.150	in	0.017	✓ Pass



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Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 11' 6" - Critical

Moment, M_x = 2.1 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 0.4 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.003



Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Yielding: 11' 6" - Critical

Dist of M_{rx} along member = 11' 6" ft, in

Required flexural strength, M_{rx1} = 2.1 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.013



Pass

Deflection

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 11' 6" ft, in

Max. Total load deflection = 0.019 in

Span over limit = 1.150 in

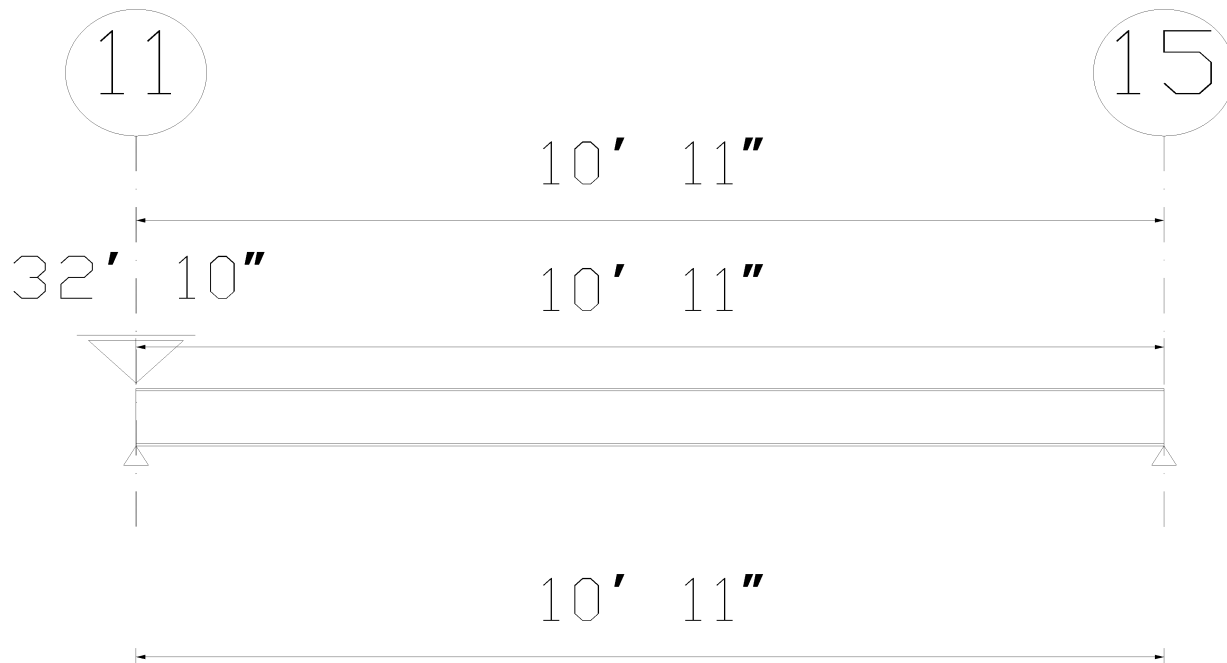
Design limit = 1.150 in

Utilization Ratio = 0.017



Pass

SB 2-50



Roof: SB 2-50 - 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	10' 11"	•	1.000	•	1.000		1.000		1.000
support	10' 11"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	0.1	56.2	kip	0.002	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	0.3	63.7	kip ft	0.005	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.003	-	in	-	-
Deflection Total	1	0.003	0.546	in	0.006	✓ Pass



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Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 5' 5 1/2" - Critical

Moment, M_x = 0.3 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 0.1 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.002



Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 5' 5 1/2" - Critical

Dist of M_{rx} along member = 5' 5 1/2" ft, in

Required flexural strength, M_{rx1} = 0.3 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.005



Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 5' 5 1/2" ft, in

Max. Total load deflection = 0.003 in

Span over limit = 0.546 in

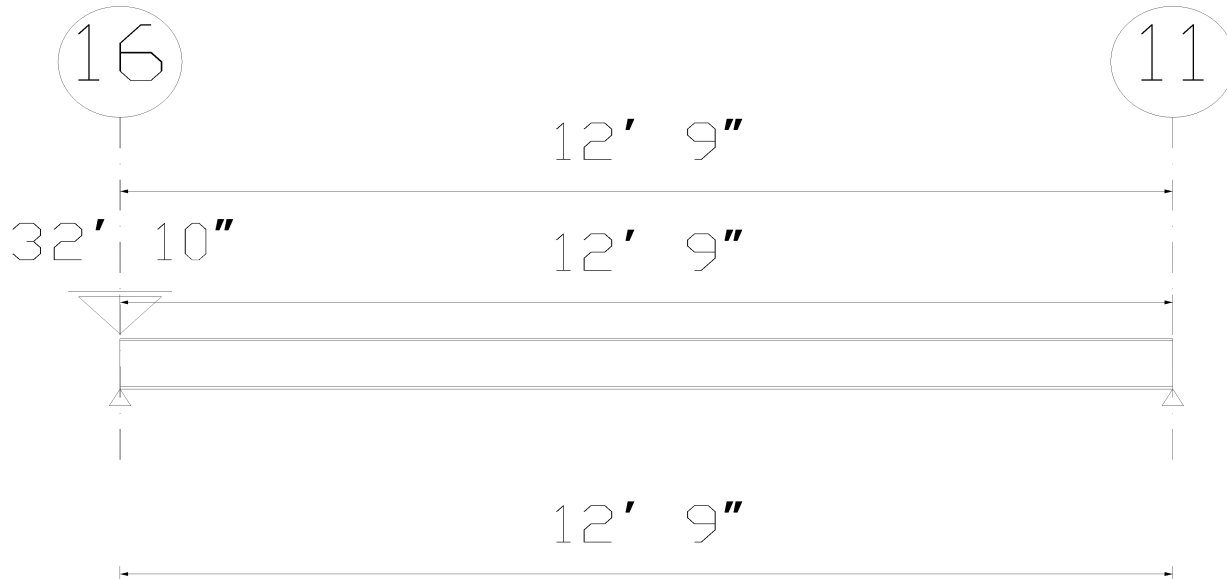
Design limit = 0.546 in

Utilization Ratio = 0.006



Pass

SB 2-51



Roof: SB 2-51 - 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	12' 9"	•	1.000		1.000		1.000		1.000
support	12' 9"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	0.1	56.2	kip	0.002	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	0.4	63.7	kip ft	0.007	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.006	-	in	-	-
Deflection Total	1	0.006	0.637	in	0.010	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical



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Span 1 W 8x18 A992-50 - Critical

Flexural: Position 6' 4 1/2" - Critical

Moment, M_x = 0.4 kip ftElastic modulus of steel, E = 29000 ksiMinimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 0.1 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.002



Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 6' 4 1/2" - Critical

Dist of M_{rx} along member = 6' 4 1/2" ft, inRequired flexural strength, M_{rx1} = 0.4 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.007



Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 6' 4 1/2" ft, in

Max. Total load deflection = 0.006 in

Span over limit = 0.637 in

Design limit = 0.637 in

Utilization Ratio = 0.010



Pass

SB 2-52



Roof: SB 2-52-1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	9' 0"	•	1.000		1.000		1.000		1.000
support	9' 0"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major		No Significant Forces		kip	-	Not required
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	0.2	63.7	kip ft	0.003	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.002	-	in	-	-



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Total	1	0.002	0.450	in	0.004	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 4' 6" - Critical

Moment, M_x = 0.2 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Flexure Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 4' 6" - Critical

Dist of M_{rx} along member = 4' 6" ft, in

Required flexural strength, M_{rx1} = 0.2 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = **0.003**

✓ Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 4' 6" ft, in

Max. Total load deflection = 0.002 in

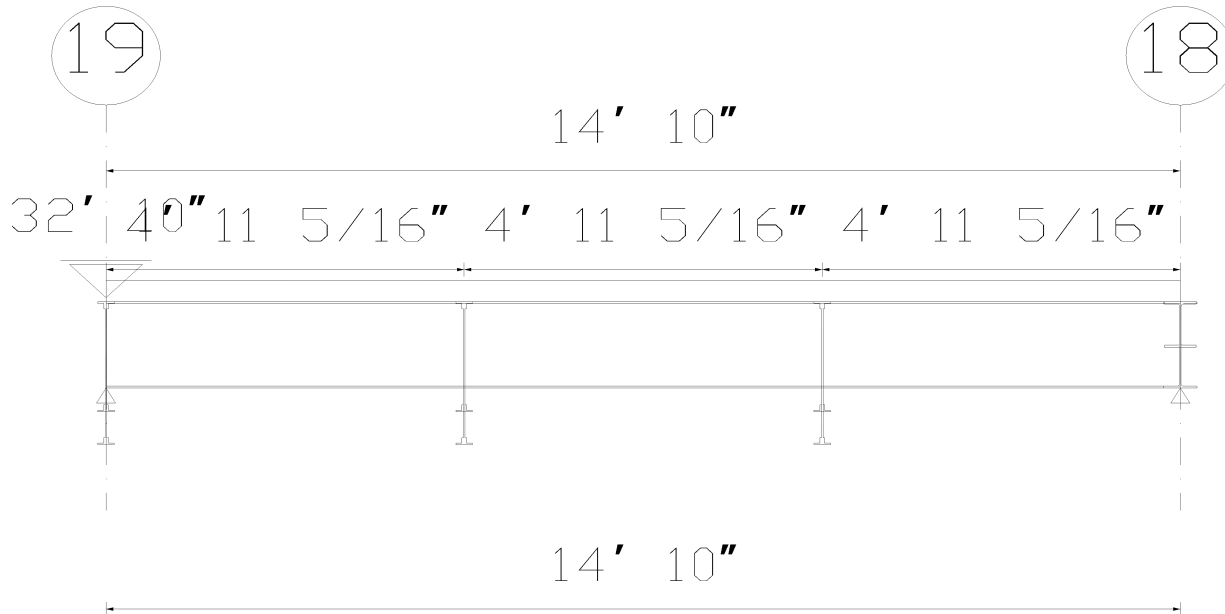
Span over limit = 0.450 in

Design limit = 0.450 in

Utilization Ratio = **0.004**

✓ Pass

SB 2-53



Roof: SB 2-53 - 1
W 16x26 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 11 3/8"	•	1.000		1.000		1.000		1.000
member	4' 11 3/8"	•						•	
sub-beam	4' 11 3/8"	•	1.000		1.000		1.000		1.000
member	9' 10 5/8"	•						•	
sub-beam	4' 11 3/8"	•	1.000		1.000		1.000		1.000
support	14' 10"	•		•		•		•	

Static Design Summary

Summary W 16x26

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	14.4	106.0	kip	0.136	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	70.8	165.7	kip ft	0.427	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.009	-	in	-	-
Deflection Slab	2	0.194	0.742	in	0.261	✓ Pass



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Dead	2	0.087	0.494	in	0.176	✓ Pass
Deflection Total	2	0.290	0.742	in	0.390	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 4' 11 3/8" - Critical

Moment, M_x = 70.7 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 14.4 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.136

✓ Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Yielding: 7' 5" - Critical

Dist of M_{rx} along member = 7' 5" ft, in

Required flexural strength, M_{rx1} = 70.8 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.427

✓ Pass

Deflection

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 7' 5" ft, in

Max. Total load deflection = 0.290 in

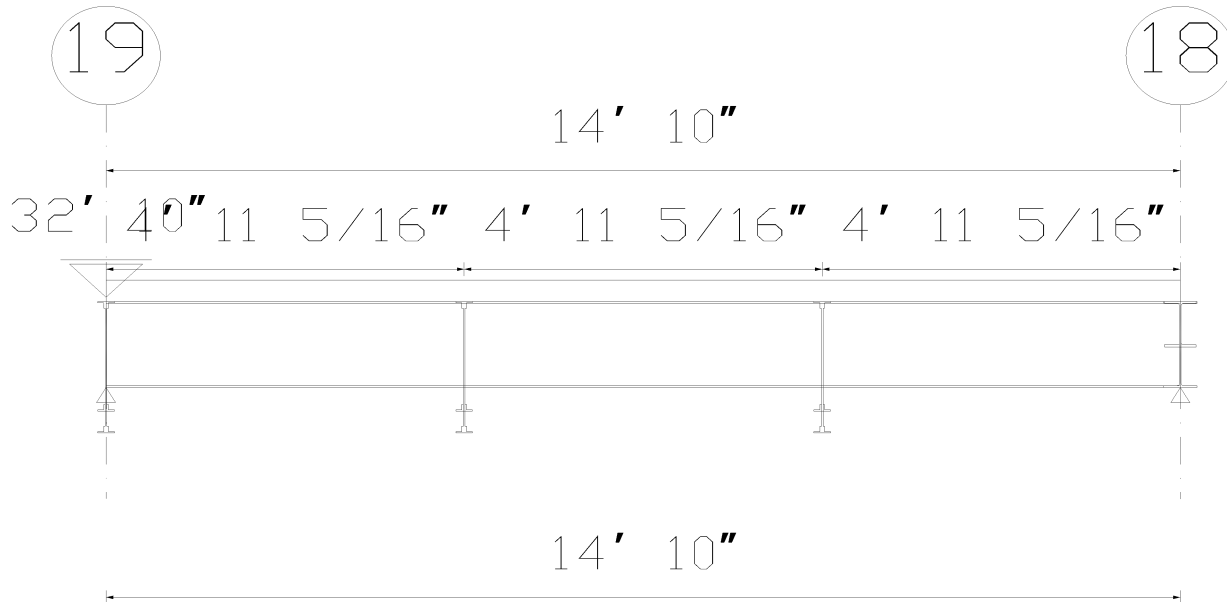
Span over limit = 0.742 in

Design limit = 0.742 in

Utilization Ratio = 0.390

✓ Pass

SB 2-54



Roof: SB 2-54 - 1
W 16x26 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 11 3/8"	•	1.000		1.000		1.000		1.000
member	4' 11 3/8"	•						•	
sub-beam	4' 11 3/8"	•	1.000		1.000		1.000		1.000
member	9' 10 5/8"	•						•	
sub-beam	4' 11 3/8"	•	1.000		1.000		1.000		1.000
support	14' 10"	•		•		•		•	

Static Design Summary

Summary W 16x26

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	2	-13.7	106.0	kip	0.129	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	67.4	165.7	kip ft	0.407	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.008	-	in	-	-
Deflection Slab	2	0.185	0.742	in	0.249	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Dead	2	0.083	0.494	in	0.167	✓ Pass
Deflection Total	2	0.276	0.742	in	0.372	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 4' 11 3/8" - Critical

Moment, M_x = 67.3 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 14' 10" - Critical

Position of V_{ry} = 14' 10" ft, in

Required major axis shear strength, V_{ry} = 13.7 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.129



Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Yielding: 7' 5 3/4" - Critical

Dist of M_{rx} along member = 7' 5 3/4" ft, in

Required flexural strength, M_{rx1} = 67.4 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.407



Pass

Deflection

1 Construction Stage - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 7' 5" ft, in

Max. Total load deflection = 0.276 in

Span over limit = 0.742 in

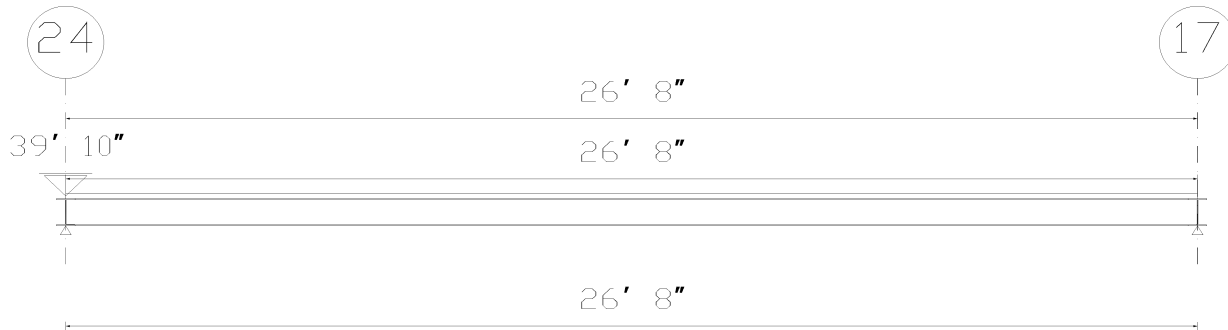
Design limit = 0.742 in

Utilization Ratio = 0.372



Pass

SB 3-1



Clerestory: SB 3-1 - 1 (W 8x18 A992-50)

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	26' 8"	•	1.000	•	1.000	•	1.000	•	1.000
support	26' 8"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	2.4	56.2	kip	0.043	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	16.1	63.7	kip ft	0.252	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.114	-	in	-	-
Deflection Slab	2	0.848	1.333	in	0.636	✓ Pass
Deflection Total	1	0.962	1.333	in	0.722	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 13' 4" - Critical

Moment, M_x = 16.1 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical



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Position of V_{ry} = 0" ft, in
Required major axis shear strength, V_{ry} = 2.4 kip
Design shear strength = 56.2 kip AISC 360 G2
Ratio = **0.043**

✓ Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 13' 4" - Critical

Dist of M_{rx} along member = 13' 4" ft, in
Required flexural strength, M_{rx1} = 16.1 kip ft
Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3
Ratio = **0.252**

✓ Pass

Deflection

1 Construction Stage - Critical

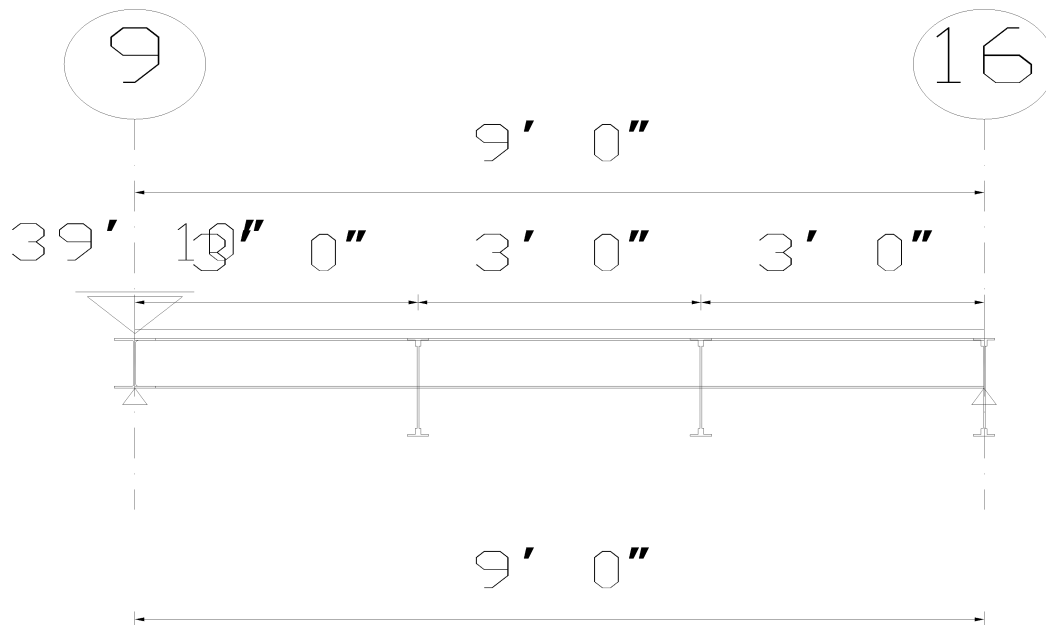
Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 13' 4" ft, in
Max. Total load deflection = 0.962 in
Span over limit = 1.333 in
Design limit = 1.333 in
Utilization Ratio = **0.722**

✓ Pass

SB 3-4



Clerestory: SB 3-4 - 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	3' 0"	•	1.000		1.000		1.000		1.000
member	3' 0"	•						•	
sub-beam	3' 0"	•	1.000		1.000		1.000		1.000
member	6' 0"	•						•	
sub-beam	3' 0"	•	1.000		1.000		1.000		1.000
support	9' 0"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.1	56.2	kip	0.056	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	9.3	63.7	kip ft	0.146	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.004	-	in	-	-



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Slab	2	0.065	0.450	in	0.145	✓ Pass
Deflection Total	2	0.069	0.450	in	0.153	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 3' 0" - Critical

Moment, M_x = 9.3 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 3.1 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.056

✓ Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 4' 7 1/8" - Critical

Dist of M_{rx} along member = 4' 7 1/8" ft, in

Required flexural strength, M_{rx1} = 9.3 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.146

✓ Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 4' 6" ft, in

Max. Total load deflection = 0.069 in

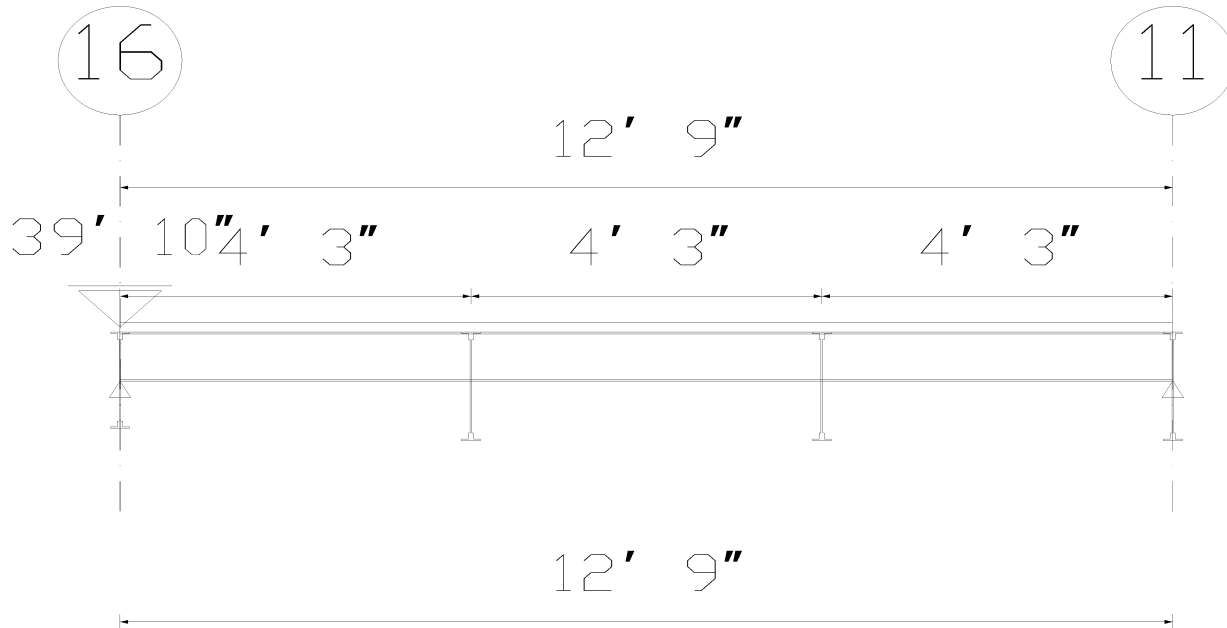
Span over limit = 0.450 in

Design limit = 0.450 in

Utilization Ratio = 0.153

✓ Pass

SB 3-5



Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 3"	•	1.000		1.000		1.000		1.000
member	4' 3"	•						•	
sub-beam	4' 3"	•	1.000		1.000		1.000		1.000
member	8' 6"	•						•	
sub-beam	4' 3"	•	1.000		1.000		1.000		1.000
support	12' 9"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-4.4	56.2	kip	0.078	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	18.6	63.7	kip ft	0.291	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.012	-	in	-	-

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Slab	2	0.254	0.637	in	0.399	✓ Pass
Deflection Total	1	0.267	0.637	in	0.418	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 4' 3" - Critical

Moment, M_x = 18.5 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Position 12' 9" - Critical

Position of V_{ry} = 12' 9" ft, in

Required major axis shear strength, V_{ry} = 4.4 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.078



Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 6' 4" - Critical

Dist of M_{rx} along member = 6' 4" ft, in

Required flexural strength, M_{rx1} = 18.6 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.291



Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 6' 4 1/2" ft, in

Max. Total load deflection = 0.267 in

Span over limit = 0.637 in

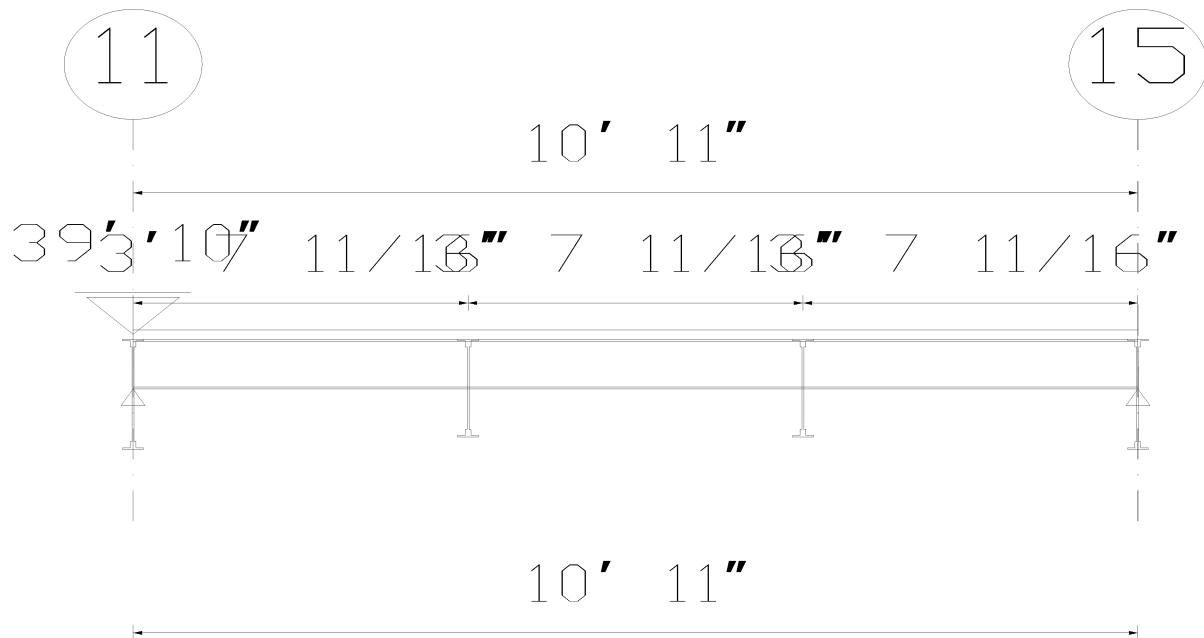
Design limit = 0.637 in

Utilization Ratio = 0.418



Pass

SB 3-6



Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	3' 7 5/8"	•	1.000		1.000		1.000		1.000
member	3' 7 5/8"	•						•	
sub-beam	3' 7 5/8"	•	1.000		1.000		1.000		1.000
member	7' 3 3/8"	•						•	
sub-beam	3' 7 5/8"	•	1.000		1.000		1.000		1.000
support	10' 11"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.8	56.2	kip	0.067	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	13.7	63.7	kip ft	0.214	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Self weight	1	0.007	-	in	-	-
Deflection Slab	2	0.138	0.546	in	0.253	✓ Pass
Deflection Total	1	0.146	0.546	in	0.267	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 3' 7 5/8" - Critical

Moment, M_x =13.6 kip ft

Elastic modulus of steel, E =29000 ksi

Minimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in

Required major axis shear strength, V_{ry} =3.8 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.067

✓ Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 5' 6 7/8" - Critical

Dist of M_{rx} along member =5' 6 7/8" ft, in

Required flexural strength, M_{rx1} =13.7 kip ft

Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3

Ratio =0.214

✓ Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =5' 5 1/2" ft, in

Max. Total load deflection =0.146 in

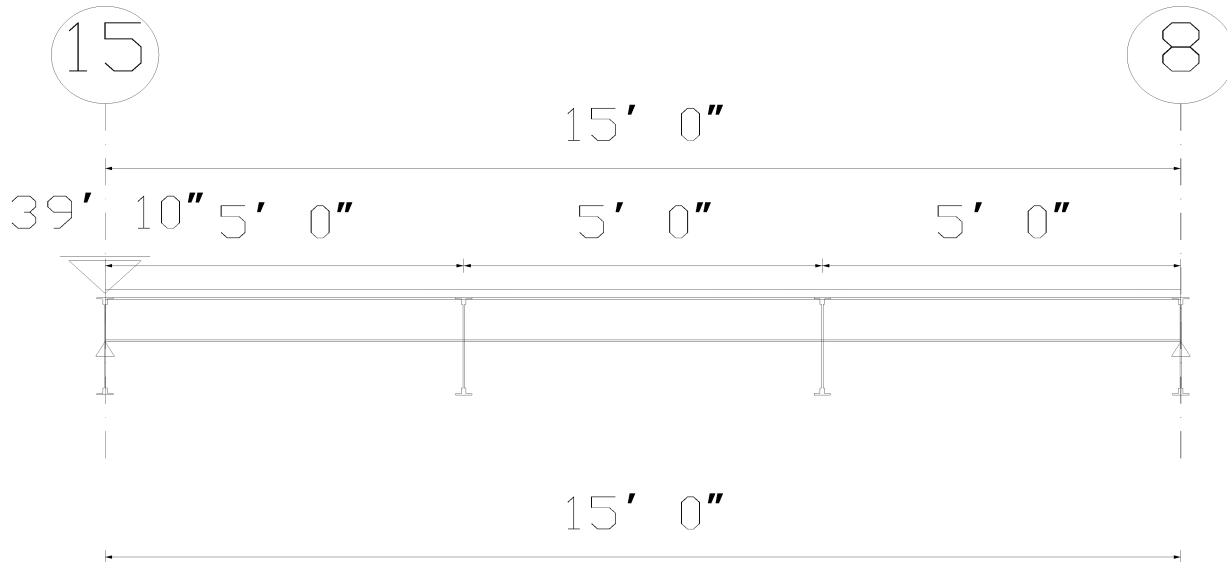
Span over limit =0.546 in

Design limit =0.546 in

Utilization Ratio =0.267

✓ Pass

SB 3-7



Clerestory: SB 3-7 = 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
member	5' 0"	•						•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
member	10' 0"	•						•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
support	15' 0"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	2	-5.2	56.2	kip	0.092	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	25.6	63.7	kip ft	0.402	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.022	-	in	-	-
Deflection Slab	2	0.483	0.750	in	0.643	✓ Pass
Deflection Total	2	0.504	0.750	in	0.672	✓ Pass



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Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 5' 0" - Critical

Moment, M_x = 25.6 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 15' 0" - Critical

Position of V_{ry} = 15' 0" ft, in

Required major axis shear strength, V_{ry} = -5.2 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.092



Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 4 7/8" - Critical

Dist of M_{rx} along member = 7' 4 7/8" ft, in

Required flexural strength, M_{rx1} = 25.6 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.402



Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 7' 6" ft, in

Max. Total load deflection = 0.504 in

Span over limit = 0.750 in

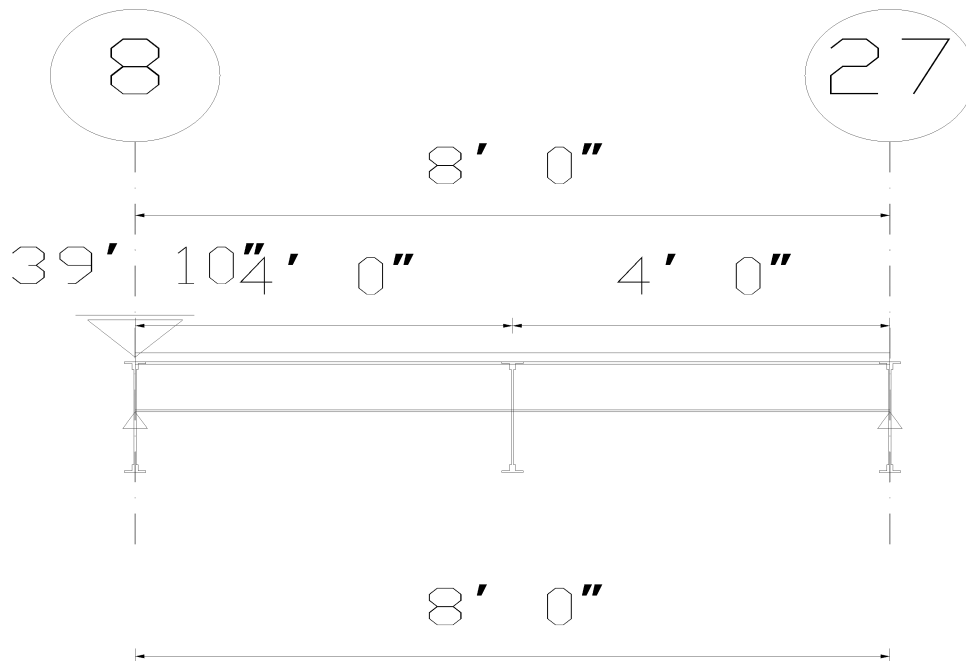
Design limit = 0.750 in

Utilization Ratio = 0.672



Pass

SB 3-8



Clerestory: SB 3-8 = 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 0"	•	1.000		1.000		1.000		1.000
member	4' 0"	•						•	
sub-beam	4' 0"	•	1.000		1.000		1.000		1.000
support	8' 0"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	2.1	56.2	kip	0.037	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	8.2	63.7	kip ft	0.129	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.002	-	in	-	-



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Slab	2	0.037	0.400	in	0.093	✓ Pass
Deflection Total	4	0.039	0.400	in	0.098	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 4' 0" - Critical

Moment, M_x = 8.2 kip ftElastic modulus of steel, E = 29000 ksiMinimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 2.1 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.037

✓ Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 4' 0" - Critical

Dist of M_{rx} along member = 4' 0" ft, inRequired flexural strength, M_{rx1} = 8.2 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.129

✓ Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 4' 0" ft, in

Max. Total load deflection = 0.039 in

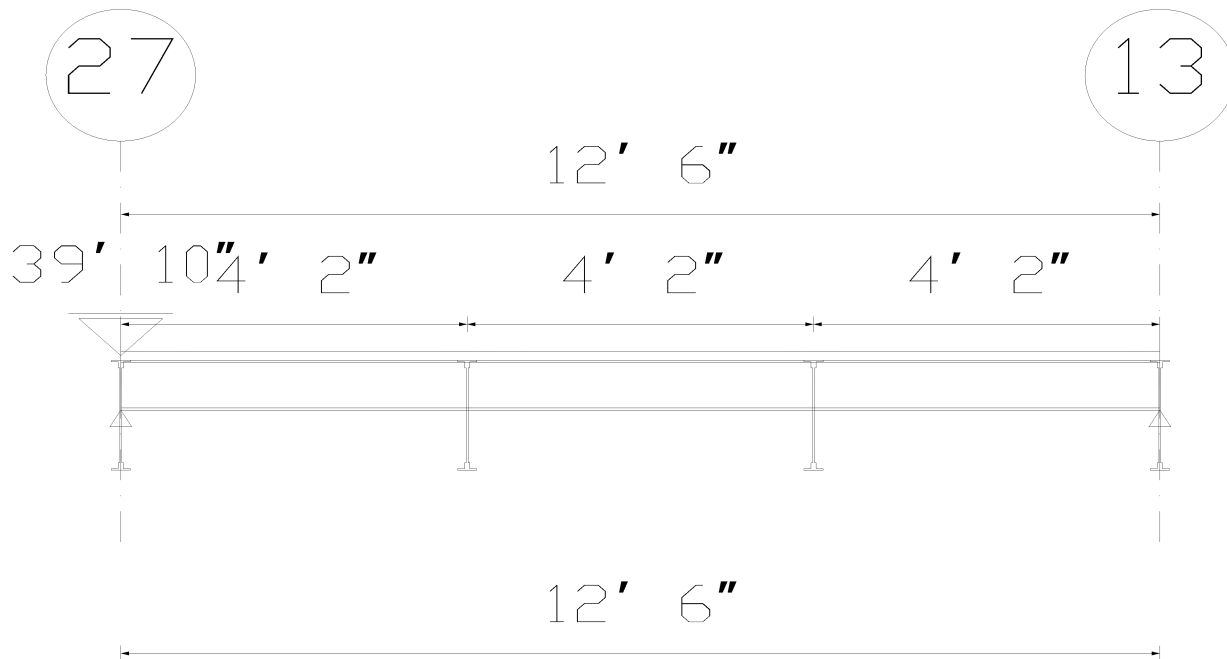
Span over limit = 0.400 in

Design limit = 0.400 in

Utilization Ratio = 0.098

✓ Pass

SB 3-9



Clerestory: SB 3-9 - 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 2"	•	1.000		1.000		1.000	•	1.000
member	4' 2"	•						•	
sub-beam	4' 2"	•	1.000		1.000		1.000	•	1.000
member	8' 4"	•						•	
sub-beam	4' 2"	•	1.000		1.000		1.000	•	1.000
support	12' 6"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-4.3	56.2	kip	0.077	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	17.9	63.7	kip ft	0.280	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Self weight	1	0.012	-	in	-	-
Deflection Slab	2	0.235	0.625	in	0.376	✓ Pass
Deflection Total	4	0.247	0.625	in	0.395	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 4' 2" - Critical

Moment, M_x =17.8 kip ftElastic modulus of steel, E =29000 ksiMinimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Position 12' 6" - Critical

Position of V_{ry} =12' 6" ft, inRequired major axis shear strength, V_{ry} =4.3 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.077

✓ Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 6' 1 7/8" - Critical

Dist of M_{rx} along member =6' 1 7/8" ft, inRequired flexural strength, M_{rx1} =17.9 kip ft

Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3

Ratio =0.280

✓ Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =6' 3" ft, in

Max. Total load deflection =0.247 in

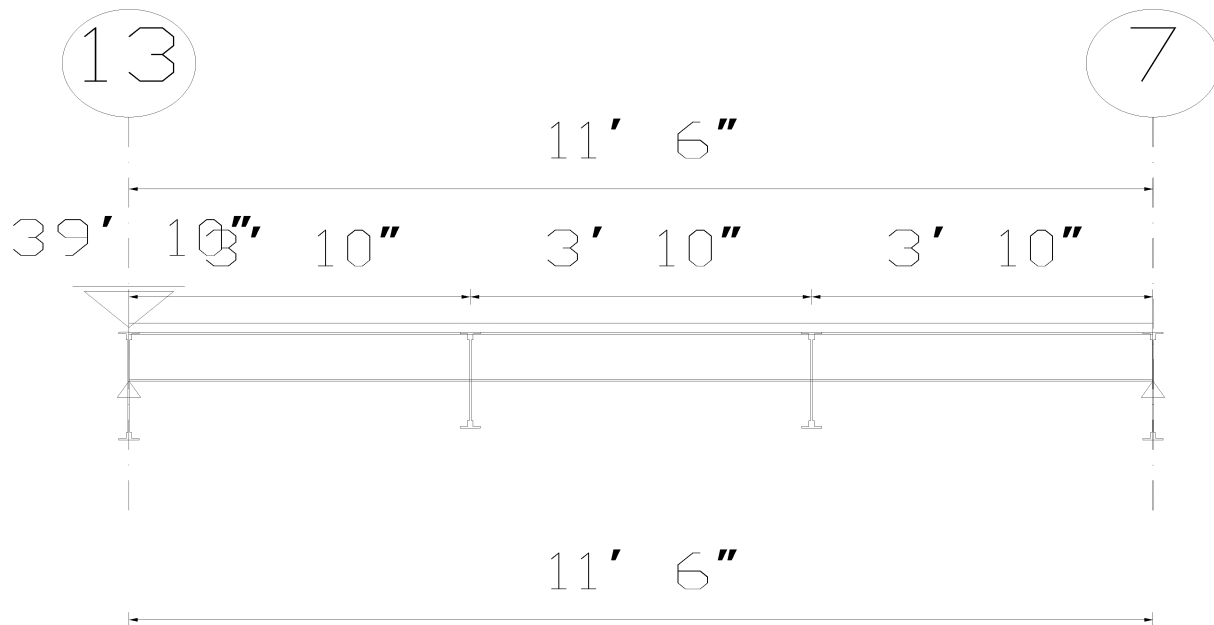
Span over limit =0.625 in

Design limit =0.625 in

Utilization Ratio =0.395

✓ Pass

SB 3-10



Clerestory: SB 3-10 - 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	3' 10"	•	1.000		1.000		1.000		1.000
member	3' 10"	•						•	
sub-beam	3' 10"	•	1.000		1.000		1.000		1.000
member	7' 8"	•						•	
sub-beam	3' 10"	•	1.000		1.000		1.000		1.000
support	11' 6"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	4.0	56.2	kip	0.071	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	15.1	63.7	kip ft	0.238	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.009	-	in	-	-



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Slab	2	0.170	0.575	in	0.295	✓ Pass
Deflection Total	4	0.178	0.575	in	0.310	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 3' 10" - Critical

Moment, M_x =15.1 kip ft

Elastic modulus of steel, E =29000 ksi

Minimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in

Required major axis shear strength, V_{ry} =4.0 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =**0.071**

✓ Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 5' 9 3/4" - Critical

Dist of M_{rx} along member =5' 9 3/4" ft, in

Required flexural strength, M_{rx1} =15.1 kip ft

Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3

Ratio =**0.238**

✓ Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =5' 9" ft, in

Max. Total load deflection =0.178 in

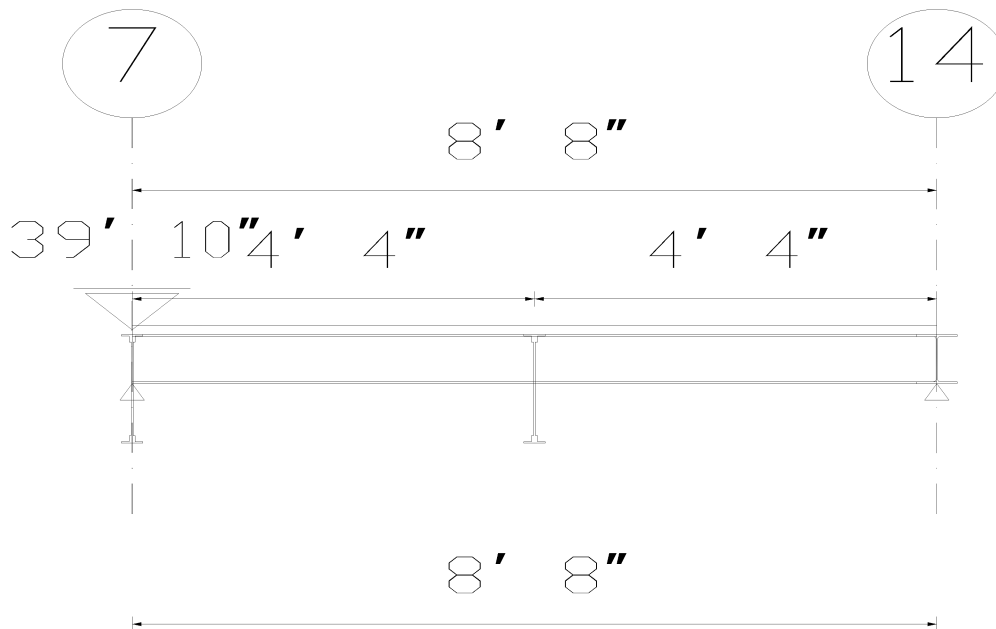
Span over limit =0.575 in

Design limit =0.575 in

Utilization Ratio =**0.310**

✓ Pass

SB 3-11



Clerestory: SB 3-11 - 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 4"	•	1.000		1.000		1.000	•	1.000
member	4' 4"	•						•	
sub-beam	4' 4"	•	1.000		1.000		1.000		1.000
support	8' 8"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-2.3	56.2	kip	0.040	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	9.6	63.7	kip ft	0.151	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.003	-	in	-	-
Deflection Slab	2	0.051	0.433	in	0.117	✓ Pass



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Total	2	0.053	0.433	in	0.123	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 4' 4" - Critical

Moment, M_x = 9.6 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Position 8' 8" - Critical

Position of V_{ry} = 8' 8" ft, in

Required major axis shear strength, V_{ry} = 2.3 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.040

✓ Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 4' 4" - Critical

Dist of M_{rx} along member = 4' 4" ft, in

Required flexural strength, M_{rx1} = 9.6 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.151

✓ Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 4' 4" ft, in

Max. Total load deflection = 0.053 in

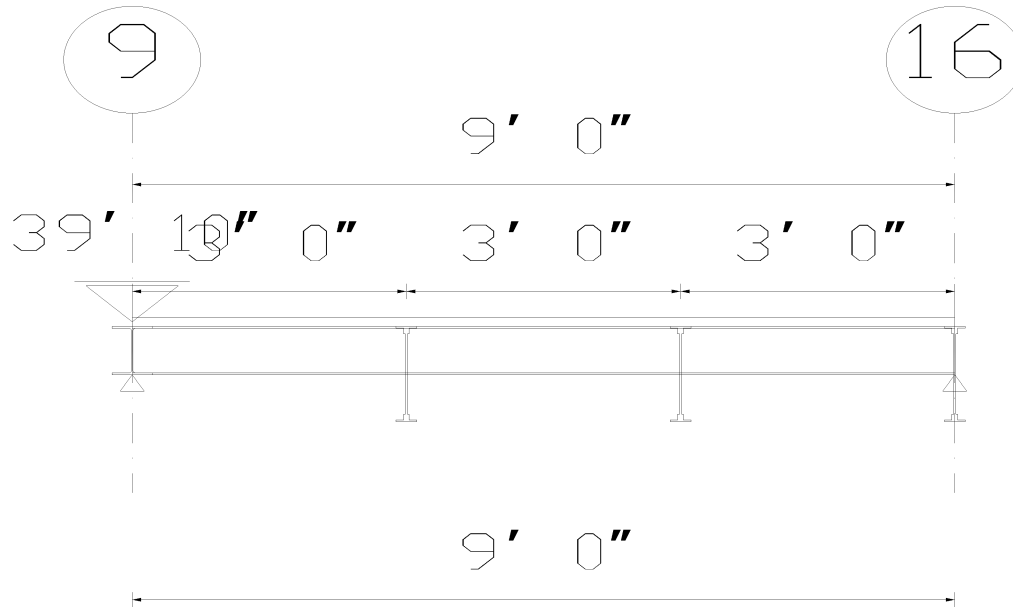
Span over limit = 0.433 in

Design limit = 0.433 in

Utilization Ratio = 0.123

✓ Pass

SB 3-13



Clerestory: SB 3-13 - 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	3' 0"	•	1.000		1.000		1.000		1.000
member	3' 0"	•						•	
sub-beam	3' 0"	•	1.000		1.000		1.000		1.000
member	6' 0"	•						•	
sub-beam	3' 0"	•	1.000		1.000		1.000		1.000
support	9' 0"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-3.1	56.2	kip	0.056	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	9.3	63.7	kip ft	0.146	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.004	-	in	-	-



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Slab	2	0.065	0.450	in	0.145	✓ Pass
Deflection Total	2	0.069	0.450	in	0.153	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 3' 0" - Critical

Moment, M_x = 9.3 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Position 9' 0" - Critical

Position of V_{ry} = 9' 0" ft, in

Required major axis shear strength, V_{ry} = -3.1 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.056



Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 4' 4 7/8" - Critical

Dist of M_{rx} along member = 4' 4 7/8" ft, in

Required flexural strength, M_{rx1} = 9.3 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.146



Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 4' 6" ft, in

Max. Total load deflection = 0.069 in

Span over limit = 0.450 in

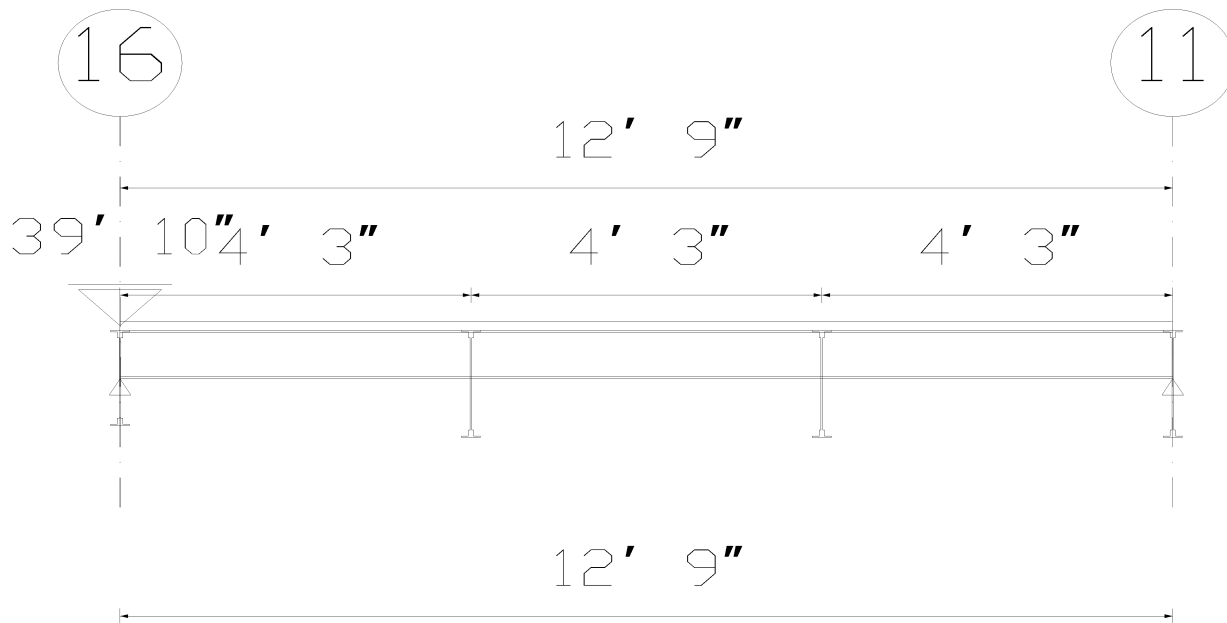
Design limit = 0.450 in

Utilization Ratio = 0.153



Pass

SB 3-14



Clerestory: SB 3-14 = 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 3"	•	1.000		1.000		1.000		1.000
member	4' 3"	•						•	
sub-beam	4' 3"	•	1.000		1.000		1.000		1.000
member	8' 6"	•						•	
sub-beam	4' 3"	•	1.000		1.000		1.000		1.000
support	12' 9"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	4.4	56.2	kip	0.078	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	18.6	63.7	kip ft	0.291	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.012	-	in	-	-

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Slab	2	0.254	0.637	in	0.399	✓ Pass
Deflection Total	1	0.267	0.637	in	0.418	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 4' 3" - Critical

Moment, M_x =18.5 kip ft

Elastic modulus of steel, E =29000 ksi

Minimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in

Required major axis shear strength, V_{ry} =4.4 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.078

✓ Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 6' 5" - Critical

Dist of M_{rx} along member =6' 5" ft, in

Required flexural strength, M_{rx1} =18.6 kip ft

Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3

Ratio =0.291

✓ Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =6' 4 1/2" ft, in

Max. Total load deflection =0.267 in

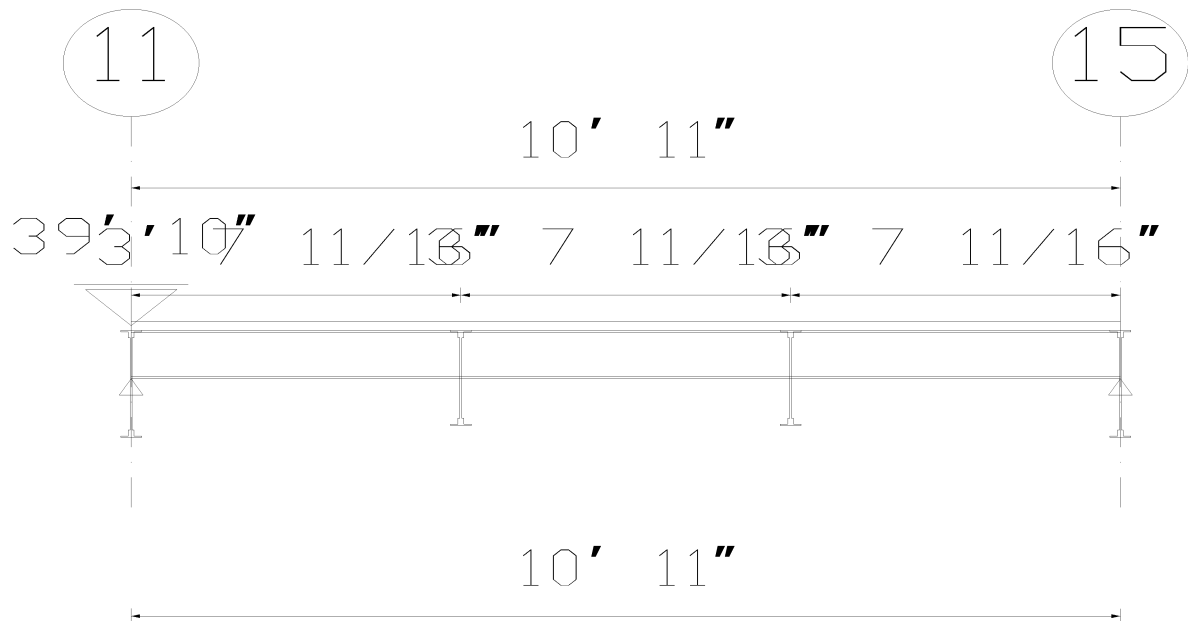
Span over limit =0.637 in

Design limit =0.637 in

Utilization Ratio =0.418

✓ Pass

SB 3-15



Clerestory: SB 3-15 = 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	3' 7 5/8"	•	1.000		1.000		1.000		1.000
member	3' 7 5/8"	•						•	
sub-beam	3' 7 5/8"	•	1.000		1.000		1.000		1.000
member	7' 3 3/8"	•						•	
sub-beam	3' 7 5/8"	•	1.000		1.000		1.000		1.000
support	10' 11"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-3.8	56.2	kip	0.067	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	13.7	63.7	kip ft	0.214	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.007	-	in	-	-

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Slab	2	0.138	0.546	in	0.253	✓ Pass
Deflection Total	4	0.146	0.546	in	0.267	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 3' 7 5/8" - Critical

Moment, M_x =13.6 kip ft

Elastic modulus of steel, E =29000 ksi

Minimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Position 10' 11" - Critical

Position of V_{ry} =10' 11" ft, in

Required major axis shear strength, V_{ry} =-3.8 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.067

✓ Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 5' 4 1/8" - Critical

Dist of M_{rx} along member =5' 4 1/8" ft, in

Required flexural strength, M_{rx1} =13.7 kip ft

Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3

Ratio =0.214

✓ Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =5' 5 1/2" ft, in

Max. Total load deflection =0.146 in

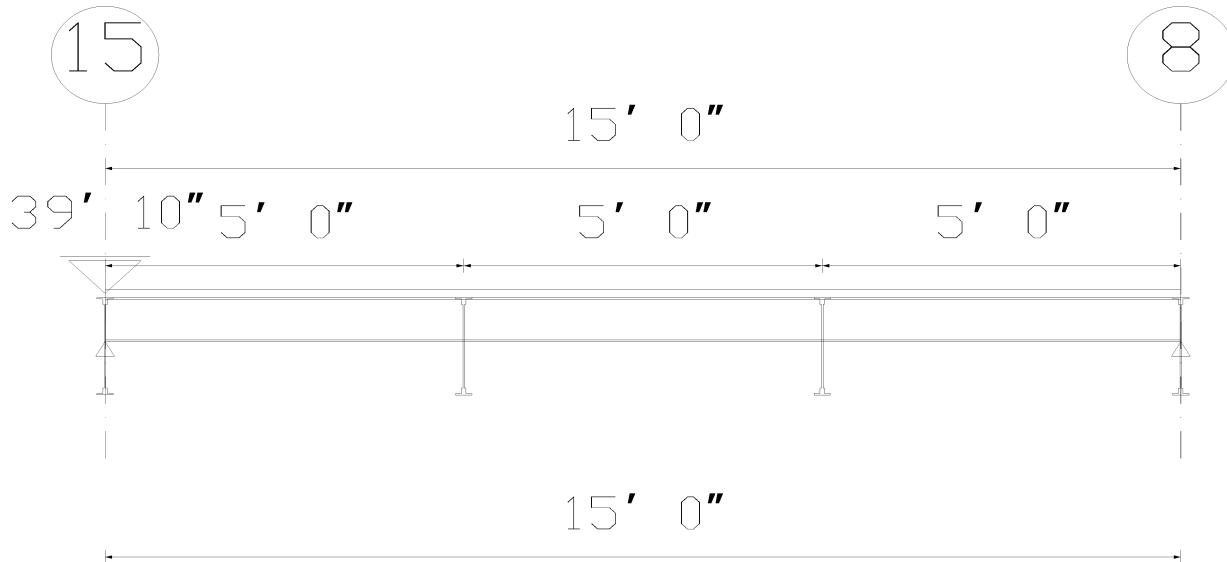
Span over limit =0.546 in

Design limit =0.546 in

Utilization Ratio =0.267

✓ Pass

SB 3-16



Clerestory: SB 3-16 - 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
member	5' 0"	•						•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
member	10' 0"	•						•	
sub-beam	5' 0"	•	1.000		1.000		1.000		1.000
support	15' 0"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	2	5.2	56.2	kip	0.092	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	25.6	63.7	kip ft	0.402	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.022	-	in	-	-
Deflection Slab	2	0.483	0.750	in	0.643	✓ Pass
Deflection Total	2	0.504	0.750	in	0.672	✓ Pass



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Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 5' 0" - Critical

Moment, M_x = 25.6 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 5.2 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.092



Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 7 1/8" - Critical

Dist of M_{rx} along member = 7' 7 1/8" ft, in

Required flexural strength, M_{rx1} = 25.6 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.402



Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 7' 6" ft, in

Max. Total load deflection = 0.504 in

Span over limit = 0.750 in

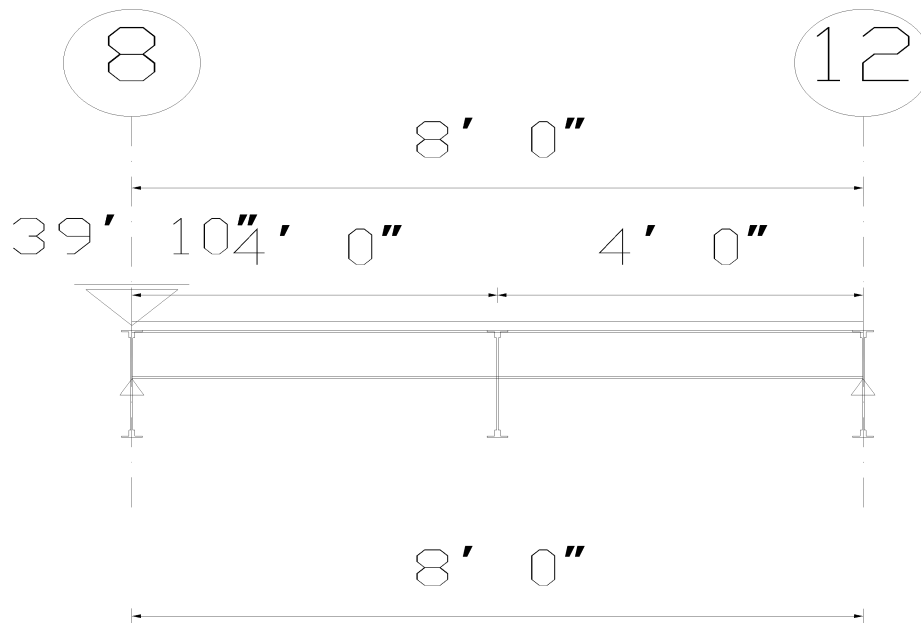
Design limit = 0.750 in

Utilization Ratio = 0.672



Pass

SB 3-17



Clerestory: SB 3-17 - 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 0"	•	1.000		1.000		1.000		1.000
member	4' 0"	•						•	
sub-beam	4' 0"	•	1.000		1.000		1.000		1.000
support	8' 0"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-2.1	56.2	kip	0.037	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	2	8.2	63.7	kip ft	0.129	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.002	-	in	-	-
Deflection Slab	2	0.037	0.400	in	0.093	✓ Pass
Deflection Total	2	0.039	0.400	in	0.098	✓ Pass



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Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 4' 0" - Critical

Moment, M_x = 8.2 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Position 8' 0" - Critical

Position of V_{ry} = 8' 0" ft, in

Required major axis shear strength, V_{ry} = -2.1 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.037



Pass

Flexure Major

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 4' 0" - Critical

Dist of M_{rx} along member = 4' 0" ft, in

Required flexural strength, M_{rx1} = 8.2 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.129



Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 4' 0" ft, in

Max. Total load deflection = 0.039 in

Span over limit = 0.400 in

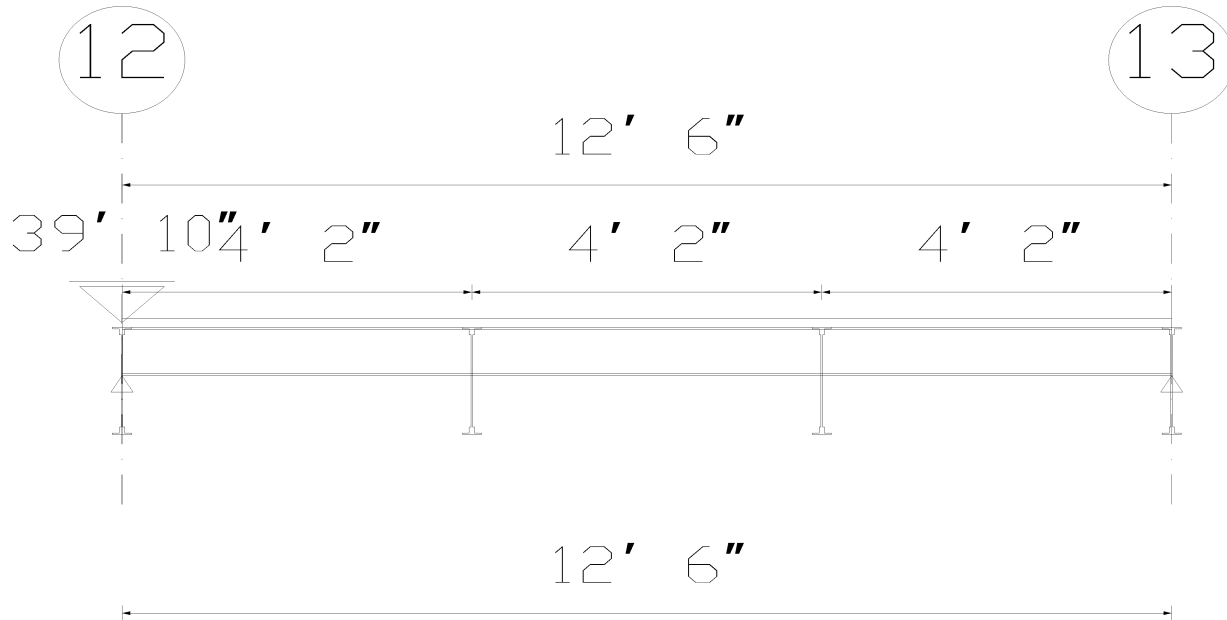
Design limit = 0.400 in

Utilization Ratio = 0.098



Pass

SB 3-18



Clerestory: SB 3-18 - 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 2"	•	1.000		1.000		1.000		1.000
member	4' 2"	•						•	
sub-beam	4' 2"	•	1.000		1.000		1.000		1.000
member	8' 4"	•						•	
sub-beam	4' 2"	•	1.000		1.000		1.000		1.000
support	12' 6"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	4.3	56.2	kip	0.077	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	17.9	63.7	kip ft	0.280	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.012	-	in	-	-



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Slab	2	0.235	0.625	in	0.376	✓ Pass
Deflection Total	1	0.247	0.625	in	0.395	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 4' 2" - Critical

Moment, M_x = 17.8 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 4.3 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.077

✓ Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 6' 4 1/8" - Critical

Dist of M_{rx} along member = 6' 4 1/8" ft, in

Required flexural strength, M_{rx1} = 17.9 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.280

✓ Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 6' 3" ft, in

Max. Total load deflection = 0.247 in

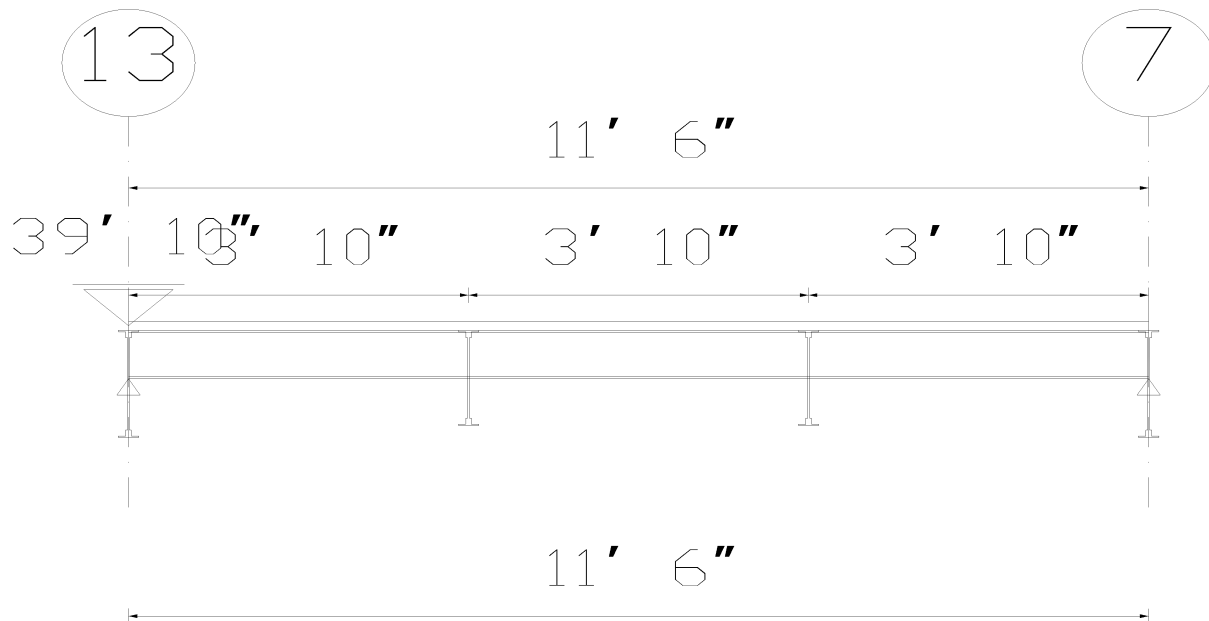
Span over limit = 0.625 in

Design limit = 0.625 in

Utilization Ratio = 0.395

✓ Pass

SB 3-19



Clerestory: SB 3-19 = 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	3' 10"	•	1.000		1.000		1.000		1.000
member	3' 10"	•						•	
sub-beam	3' 10"	•	1.000		1.000		1.000		1.000
member	7' 8"	•						•	
sub-beam	3' 10"	•	1.000		1.000		1.000		1.000
support	11' 6"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-4.0	56.2	kip	0.071	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	15.1	63.7	kip ft	0.238	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.009	-	in	-	-



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Slab	2	0.170	0.575	in	0.295	✓ Pass
Deflection Total	4	0.178	0.575	in	0.310	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 3' 10" - Critical

Moment, M_x =15.1 kip ft

Elastic modulus of steel, E =29000 ksi

Minimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Position 11' 6" - Critical

Position of V_{ry} =11' 6" ft, in

Required major axis shear strength, V_{ry} =-4.0 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.071



Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 5' 8 1/4" - Critical

Dist of M_{rx} along member =5' 8 1/4" ft, in

Required flexural strength, M_{rx1} =15.1 kip ft

Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3

Ratio =0.238



Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =5' 9" ft, in

Max. Total load deflection =0.178 in

Span over limit =0.575 in

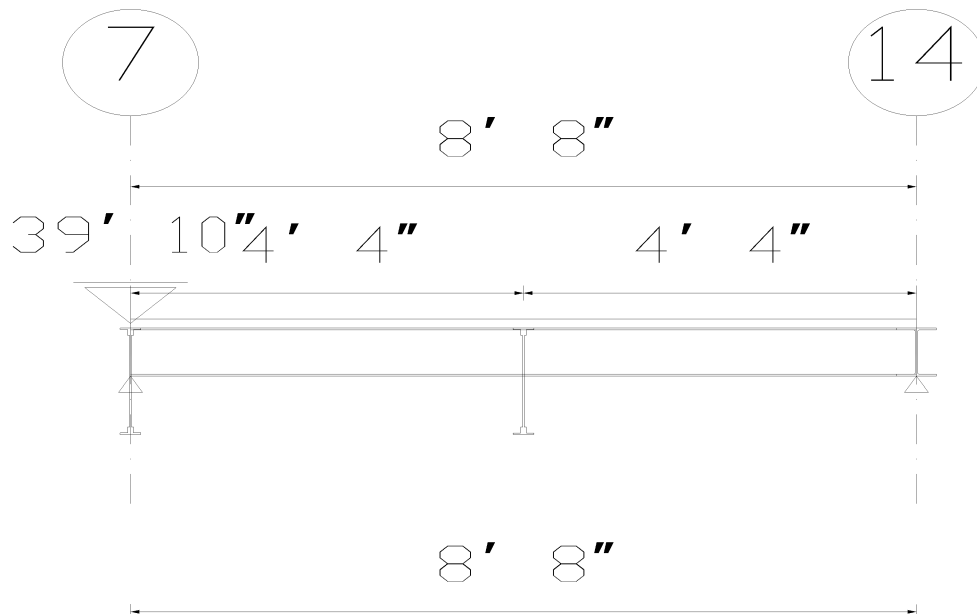
Design limit =0.575 in

Utilization Ratio =0.310



Pass

SB 3-20



Clerestory: SB 3-20 - 1
W 8x18 A992-50

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 4"	•	1.000		1.000		1.000		1.000
member	4' 4"	•						•	
sub-beam	4' 4"	•	1.000		1.000		1.000		1.000
support	8' 8"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	2.3	56.2	kip	0.040	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	9.6	63.7	kip ft	0.151	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.003	-	in	-	-
Deflection Slab	2	0.051	0.433	in	0.117	✓ Pass
Deflection Total	1	0.053	0.433	in	0.123	✓ Pass



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Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 4' 4" - Critical

Moment, M_x = 9.6 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 2.3 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.040



Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 4' 4" - Critical

Dist of M_{rx} along member = 4' 4" ft, in

Required flexural strength, M_{rx1} = 9.6 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.151



Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 4' 4" ft, in

Max. Total load deflection = 0.053 in

Span over limit = 0.433 in

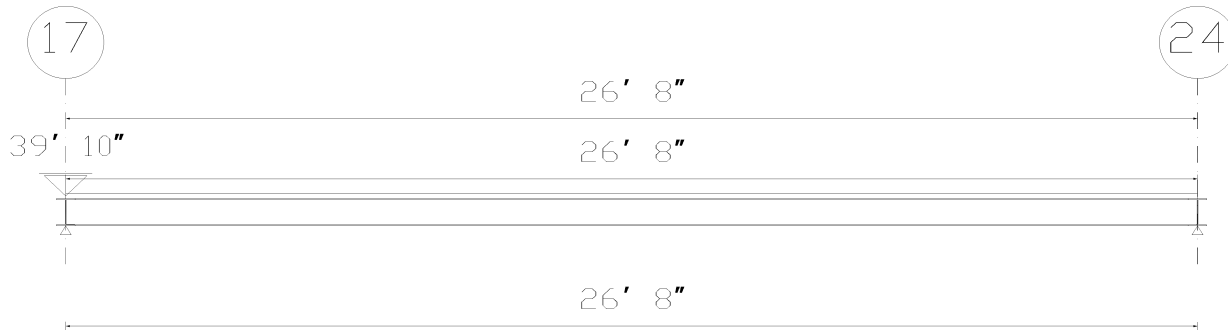
Design limit = 0.433 in

Utilization Ratio = 0.123



Pass

SB 3-21



Clerestory: SB 3-21 - 1 (W 8x18 A992-50)

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	26' 8"	•	1.000	•	1.000	•	1.000	•	1.000
support	26' 8"	•		•		•		•	

Static Design Summary

Summary W 8x18

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification		Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	1.8	56.2	kip	0.031	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	11.7	63.7	kip ft	0.184	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Axial Compression		No Significant Forces		kip	-	Not required
Combined Forces		No Significant Forces		-	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.114	-	in	-	-
Deflection Slab	2	0.587	1.333	in	0.440	✓ Pass
Deflection Total	1	0.701	1.333	in	0.526	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Classification

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 13' 4" - Critical

Moment, M_x = 11.7 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in
 Required major axis shear strength, V_{ry} = 1.8 kip
 Design shear strength = 56.2 kip AISC 360 G2
 Ratio = 0.031

Pass

Flexure Major

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Yielding: 13' 4" - Critical

Dist of M_{rx} along member = 13' 4" ft, in
 Required flexural strength, M_{rx1} = 11.7 kip ft
 Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3
 Ratio = 0.184

Pass

Deflection

1 Construction Stage - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 13' 4" ft, in
 Max. Total load deflection = 0.701 in
 Span over limit = 1.333 in
 Design limit = 1.333 in
 Utilization Ratio = 0.526

Pass

Steel

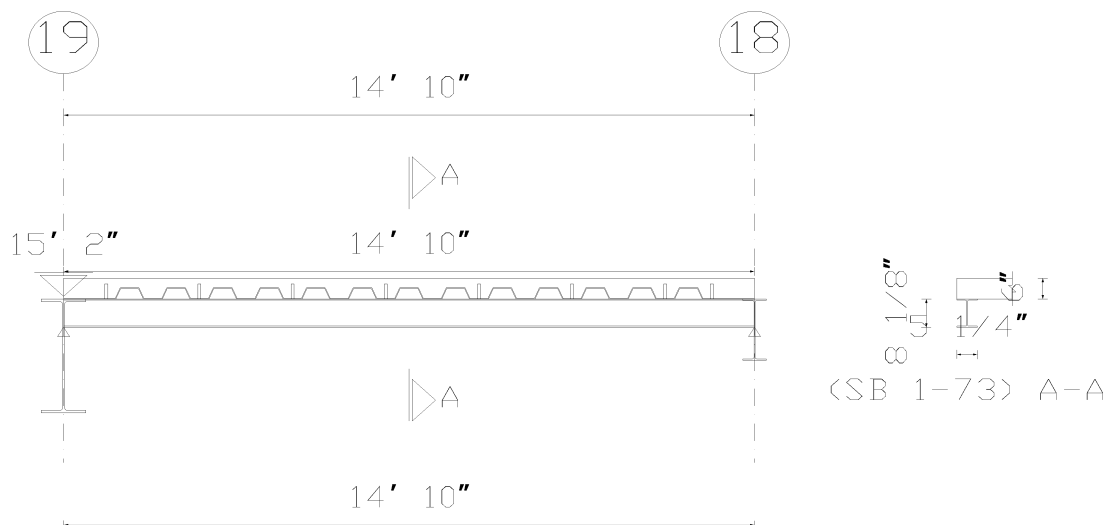
Beam Design

Beams

Composite

Rolled

SB 1-73



Second Level: SB 1-73 = 1
 W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	14' 10"	•	1.000		1.000		1.000		1.000
support	14' 10"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength
 AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	11' 5"	6	1	2
12' 5"	14' 10"	2	1	1

Decking

Manufacturer Name Gauge Yield strength
 VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
 6" ft, in 1' 10 1/4" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
 Type Area Yield strength Type Area Yield strength
 Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.168	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-4.5	56.2	kip	0.079	✓ Pass
Flexure	2	16.5	105.8	kip ft	0.156	✓ Pass
Connector Resistance	2	4	8	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.011	-	in	-	-
Deflection Slab	2	0.083	0.742	in	0.111	✓ Pass
Deflection Dead	2	0.009	0.494	in	0.019	✓ Pass
Deflection Live	2	0.047	0.494	in	0.095	✓ Pass
Deflection Post Composite	2	0.056	0.494	in	0.114	✓ Pass
Deflection Total	2	0.150	0.742	in	0.202	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	1.8	56.2	kip	0.032	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	6.6	63.7	kip ft	0.103	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.011	-	in	-	-
Deflection Total	1	0.124	0.742	in	0.168	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 7' 5" - Critical

Moment, M_x = 6.6 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 1.8 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.032



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 5" - Critical

Dist of M_{rx} along member = 7' 5" ft, in

Required flexural strength, M_{rx1} = 6.6 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.103



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 7' 5" ft, in

Max. Total load deflection = 0.124 in

Span over limit = 0.742 in

Design limit = 0.742 in

Utilization Ratio = 0.168



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 5" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w = 29.900



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h / t_w limit for plastic stress distribution =**90.553**

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 14' 10" - Critical

Position of V_{ry} =14' 10" ft, in

Required major axis shear strength, V_{ry} =4.5 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =**0.079**

✓ Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment Position - Critical

Distance of M along member =7' 5" ft, in

Required flexural strength, M_x =16.5 kip ft

Design flexural strength =105.8 kip ft

Ratio =**0.156**

✓ Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4

Degree of shear connection =**0.304**

Absolute minimum degree of shear connection =**0.250**

Optimum amount of shear connection =**0.500**

Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} =309.7 in⁴

Long term inertia, I_{aL} =309.7 in⁴

Short term inertia @ partial interaction, I_{as} =198.5 in⁴

Long term inertia @ partial interaction, I_{aL} =198.5 in⁴

Position Total load deflection =7' 5" ft, in

Deflection with full shear connection n , δ =0.131 in

Deflection of steel beam alone, δ_s =0.264 in

Minimum degree of shear connection =30.37 %

Deflection with partial shear connection, δ =0.150 in

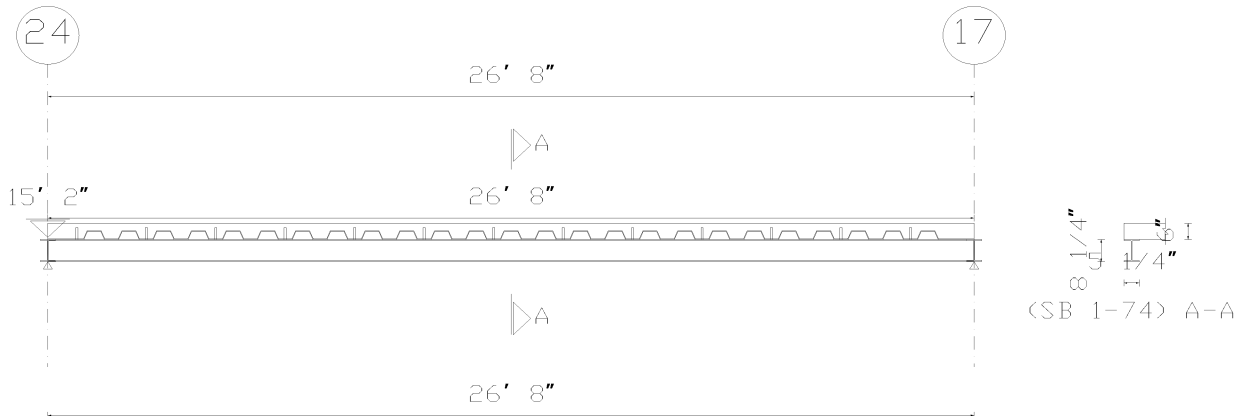
Span over limit =0.742 in

Design limit =0.742 in

Utilization Ratio =**0.202**

✓ Pass

SB 1-74



Second Level: SB 1-74 = 1
W 8x21 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	26' 8"	•	1.000		1.000		1.000		1.000
support	26' 8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	25' 4"	13	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 2' 2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x21 (13)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.762	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	7.7	62.1	kip	0.123	✓ Pass
Flexure	2	51.1	134.7	kip ft	0.379	✓ Pass
Connector Resistance	2	6	13	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.110	-	in	-	-

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Slab	2	0.661	1.333	in	0.496	✓ Pass
Deflection Dead	2	0.068	0.889	in	0.076	✓ Pass
Deflection Live	2	0.338	0.889	in	0.380	✓ Pass
Deflection Post Composite	2	0.406	0.889	in	0.456	✓ Pass
Deflection Total	2	1.177	1.333	in	0.882	✓ Pass

Construction Stage

W 8x21(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.1	62.1	kip	0.050	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	20.6	76.5	kip ft	0.269	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.110	-	in	-	-
Deflection Total	1	1.016	1.333	in	0.762	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x21 A992-50 - Critical

Flexural: Position 13' 4" - Critical

Moment, M_x = 20.6 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x21 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 3.1 kip

Design shear strength = 62.1 kip AISC 360 G2

Ratio = 0.050

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 8x21 A992-50 - Critical

Yielding: 13' 4" - Critical

Dist of M_{rx} along member = 13' 4" ft, in

Required flexural strength, M_{rx} = 20.6 kip ft

Design flexural strength = 76.5 kip ft AISC 360 F1, F2 and F3

Ratio = 0.269

✓ Pass



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Deflection

1 Construction Stage

Span 1 W 8x21 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =13' 4" ft, in
Max. Total load deflection =1.016 in
Span over limit =1.333 in
Design limit =1.333 in
Utilization Ratio =**0.762**



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

Position 13' 4" - Critical

Web class Compact AISC 360 Table B4.1b
h / t_w =**27.500**
h / t_w limit for plastic stress distribution =**90.553**

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in
Required major axis shear strength, V_{ry} =7.7 kip
Design shear strength =62.1 kip AISC 360 G2
Ratio =**0.123**



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

13' 4" Max Moment Position - Critical

Distance of M along member =13' 4" ft, in
Required flexural strength, M_x =51.1 kip ft
Design flexural strength =134.7 kip ft
Ratio =**0.379**



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

13' 4" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in
Maximum permitted group spacing =3' 0" ft, in
Number of shear connectors over full beam length 13
Number of shear connectors to critical point, N_a 6
Degree of shear connection =**0.390**
Absolute minimum degree of shear connection =**0.250**
Optimum amount of shear connection =**0.500**
Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

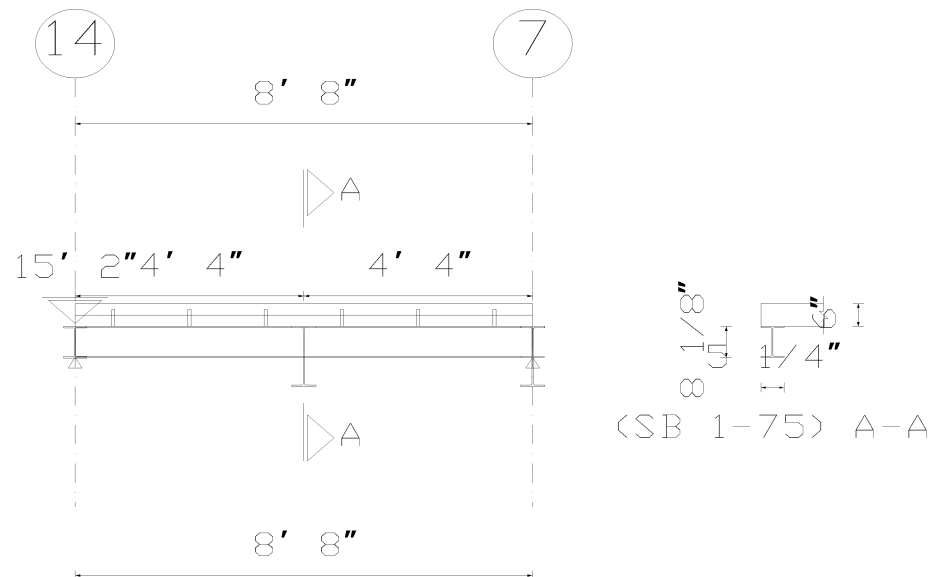
Span 1 W 8x21 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 369.9 in⁴
 Long term inertia, I_{al} = 369.9 in⁴
 Short term inertia @ partial interaction, I_{as} = 259.2 in⁴
 Long term inertia @ partial interaction, I_{al} = 259.2 in⁴
 Position Total load deflection = 13' 4" ft, in
 Deflection with full shear connection n, δ = 1.059 in
 Deflection of steel beam alone, δ_s = 2.138 in
 Minimum degree of shear connection = 38.98 %
 Deflection with partial shear connection, δ = 1.177 in
 Span over limit = 1.333 in
 Design limit = 1.333 in
 Utilization Ratio = **0.882**

✓ Pass

SB 1-75



Second Level: SB 1-75 = 1
 W 8x18 A992-50 (6) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 4"		1.000		1.000		1.000		1.000
member	4' 4"	•						•	
sub-beam	4' 4"		1.000		1.000		1.000		1.000
support	8' 8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
 AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing distance [ft, in]
0"	8' 8"	6	1	1' 5 21/64"

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 1' 1 1/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (6 (6))

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.205	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-7.6	56.2	kip	0.136	✓ Pass
Flexure	2	32.9	102.4	kip ft	0.321	✓ Pass
Connector Resistance	2	3	6 (6)	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.006	-	in	-	-
Deflection Slab	2	0.048	0.433	in	0.111	✓ Pass
Deflection Dead	2	0.007	0.289	in	0.023	✓ Pass
Deflection Live	2	0.034	0.289	in	0.116	✓ Pass
Deflection Post Composite	2	0.040	0.289	in	0.140	✓ Pass
Deflection Total	2	0.095	0.433	in	0.218	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.1	56.2	kip	0.054	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	13.1	63.7	kip ft	0.205	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.006	-	in	-	-
Deflection Total	1	0.072	0.433	in	0.166	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 4' 4" - Critical



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Moment, M_x =13.1 kip ft
Elastic modulus of steel, E =29000 ksi
Minimum yield stress, F_y =50.00 ksi
Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =3.1 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.054



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 4' 4" - Critical

Dist of M_{rx} along member =4' 4" ft, inRequired flexural strength, M_{rx1} =13.1 kip ft

Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3

Ratio =0.205



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =4' 4" ft, in

Max. Total load deflection =0.072 in

Span over limit =0.433 in

Design limit =0.433 in

Utilization Ratio =0.166



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 4' 4" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w =29.900 h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 8' 8" - Critical

Position of V_{ry} =8' 8" ft, inRequired major axis shear strength, V_{ry} =7.6 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.136



Pass

Flexure



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2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

4' 4" Max Moment Position - Critical

Distance of M along member =4' 4" ft, in

Required flexural strength, M_x =32.9 kip ft

Design flexural strength =102.4 kip ft

Ratio =**0.321**

Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

4' 4" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =1' 5 21/64" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 6

Number of shear connectors to critical point, N_a 3Degree of shear connection =**0.322**Absolute minimum degree of shear connection =**0.250**Optimum amount of shear connection =**0.500**

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{aS} =263.9 in⁴Long term inertia, I_{aL} =263.9 in⁴Short term inertia @ partial interaction, I_{aS} =176.5 in⁴Long term inertia @ partial interaction, I_{aL} =176.5 in⁴

Position Total load deflection =4' 4" ft, in

Deflection with full shear connection n , δ =0.084 inDeflection of steel beam alone, δ_s =0.153 in

Minimum degree of shear connection =32.17 %

Deflection with partial shear connection, δ =0.095 in

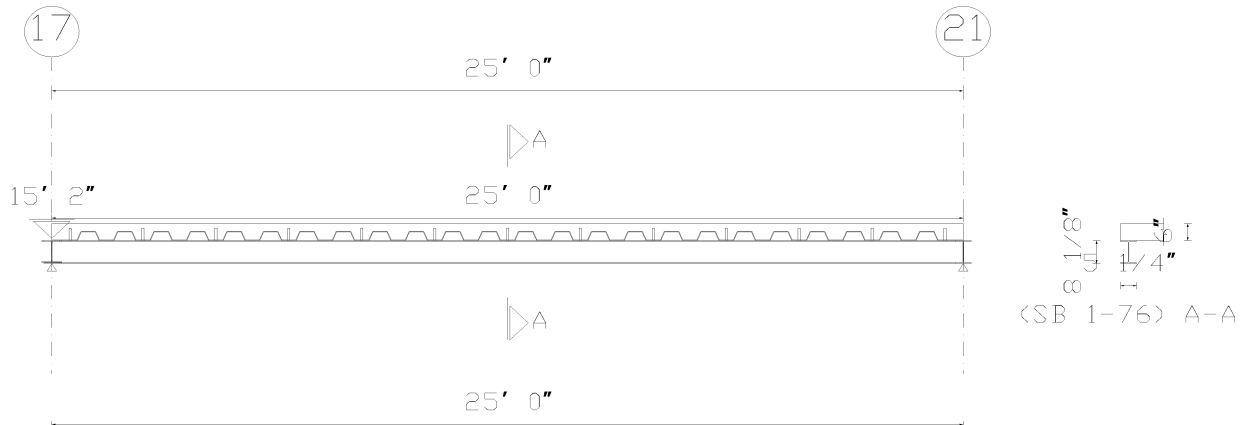
Span over limit =0.433 in

Design limit =0.433 in

Utilization Ratio =**0.218**

Pass

SB 1-76



Second Level: SB 1-76 - 1
W 8x18 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	25' 0"	•	1.000		1.000		1.000		1.000
support	25' 0"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	25' 0"	13	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 2' 3 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (13)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.789	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	7.5	56.2	kip	0.134	✓ Pass
Flexure	2	47.0	120.7	kip ft	0.389	✓ Pass
Connector Resistance	2	6	13	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.088	-	in	-	-

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Slab	2	0.655	1.250	in	0.524	✓ Pass
Deflection Dead	2	0.062	0.833	in	0.075	✓ Pass
Deflection Live	2	0.312	0.833	in	0.374	✓ Pass
Deflection Post Composite	2	0.374	0.833	in	0.449	✓ Pass
Deflection Total	2	1.118	1.250	in	0.894	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.0	56.2	kip	0.053	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	18.7	63.7	kip ft	0.294	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.088	-	in	-	-
Deflection Total	1	0.987	1.250	in	0.789	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 12' 6" - Critical

Moment, M_x = 18.7 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 3.0 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.053

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 12' 6" - Critical

Dist of M_{rx} along member = 12' 6" ft, in

Required flexural strength, M_{rx} = 18.7 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.294

✓ Pass



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Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =12' 6" ft, in

Max. Total load deflection =0.987 in

Span over limit =1.250 in

Design limit =1.250 in

Utilization Ratio =0.789



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 12' 6" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w =29.900h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =7.5 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.134



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

12' 6" Max Moment Position - Critical

Distance of M along member =12' 6" ft, in

Required flexural strength, M_x =47.0 kip ft

Design flexural strength =120.7 kip ft

Ratio =0.389



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

12' 6" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 13

Number of shear connectors to critical point, N_a 6

Degree of shear connection =0.393

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

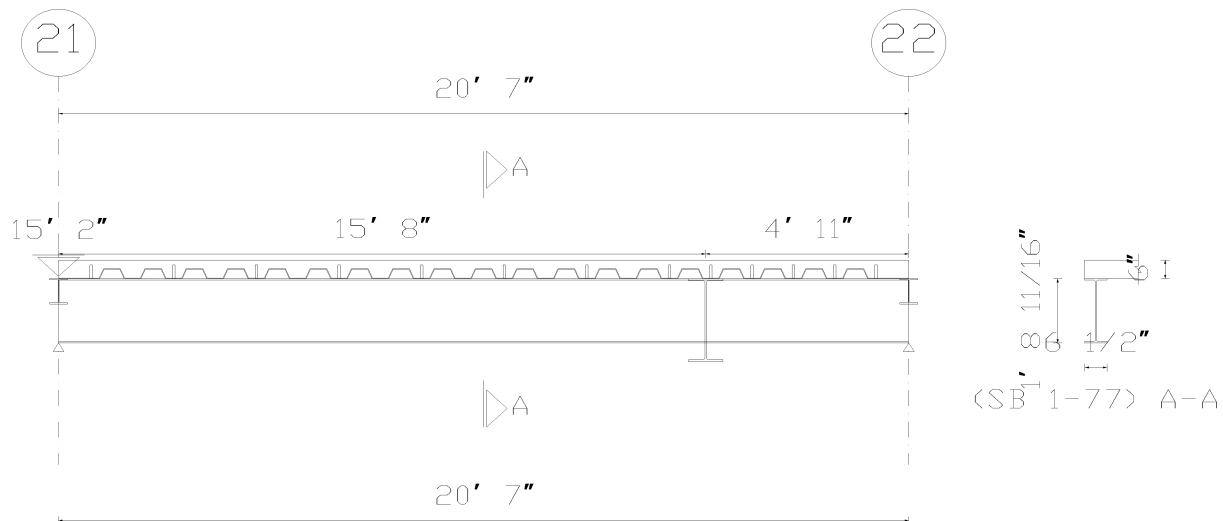
Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as}	=329.9 in ⁴
Long term inertia, I_{al}	=329.9 in ⁴
Short term inertia @ partial interaction, I_{as}	=229.9 in ⁴
Long term inertia @ partial interaction, I_{al}	=229.9 in ⁴
Position Total load deflection	=12' 6" ft, in
Deflection with full shear connection n, δ	=1.008 in
Deflection of steel beam alone, δ_s	=2.099 in
Minimum degree of shear connection	=39.31 %
Deflection with partial shear connection, δ	=1.118 in
Span over limit	=1.250 in
Design limit	=1.250 in
Utilization Ratio	=0.894

✓ Pass

SB 1-77



Second Level: SB 1-77 = 1
W 21x44 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	15' 8"	•	1.000		1.000		1.000		1.000
member	15' 8"	•						•	
sub-beam	4' 11"	•	1.000		1.000		1.000		1.000
support	20' 7"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	13' 3 1/2"	7	1	2

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
14' 3 1/2"	20' 7"	6	1	1

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 2' 3 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 21x44 (13)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.629	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-92.8	217.4	kip	0.427	✓ Pass
Flexure	2	449.8	453.8	kip ft	0.991	✓ Pass
Connector Resistance	2	5	13	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.060	-	in	-	-
Deflection Slab	2	0.300	1.029	in	0.292	✓ Pass
Deflection Dead	2	0.058	0.686	in	0.084	✓ Pass
Deflection Live	2	0.200	0.686	in	0.291	✓ Pass
Deflection Post Composite	2	0.258	0.686	in	0.376	✓ Pass
Deflection Total	2	0.617	1.029	in	0.600	✓ Pass

Construction Stage

W 21x44(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-46.4	217.4	kip	0.213	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	224.9	357.7	kip ft	0.629	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.060	-	in	-	-
Deflection Total	1	0.471	1.029	in	0.458	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Flexural: Position 11' 7 1/8" - Critical



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Moment, M_x =172.8 kip ft
Elastic modulus of steel, E =29000 ksi
Minimum yield stress, F_y =50.00 ksi
Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Position 20' 7" - Critical

Position of V_{ry} =20' 7" ft, inRequired major axis shear strength, V_{ry} =-46.4 kip

Design shear strength =217.4 kip AISC 360 G2

Ratio =0.213



Pass

Flexure Major

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Yielding: 15' 8" - Critical

Dist of M_{rx} along member =15' 8" ft, inRequired flexural strength, M_{rx1} =224.9 kip ft

Design flexural strength =357.7 kip ft AISC 360 F1, F2 and F3

Ratio =0.629



Pass

Deflection

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =11' 7 1/8" ft, in

Max. Total load deflection =0.471 in

Span over limit =1.029 in

Design limit =1.029 in

Utilization Ratio =0.458



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

Position 15' 8" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w =53.600 h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

Position 20' 7" - Critical

Position of V_{ry} =20' 7" ft, inRequired major axis shear strength, V_{ry} =-92.8 kip

Design shear strength =217.4 kip AISC 360 G2

Ratio =0.427



Pass

Flexure



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2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

15' 8" Max Moment Position - Critical

Distance of M along member =15' 8" ft, in
Required flexural strength, M_x =449.8 kip ft
Design flexural strength =453.8 kip ft
Ratio =**0.991**



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

15' 8" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 13

Number of shear connectors to critical point, N_a 5Degree of shear connection =**0.307**Absolute minimum degree of shear connection =**0.250**Optimum amount of shear connection =**0.500**

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} =2152.7 in⁴Long term inertia, I_{al} =2152.7 in⁴Short term inertia @ partial interaction, I_{as} =1568.8 in⁴Long term inertia @ partial interaction, I_{al} =1568.8 in⁴

Position Total load deflection =11' 8 7/8" ft, in

Deflection with full shear connection n , δ =0.553 inDeflection of steel beam alone, δ_s =0.821 in

Minimum degree of shear connection =30.71 %

Deflection with partial shear connection, δ =0.617 in

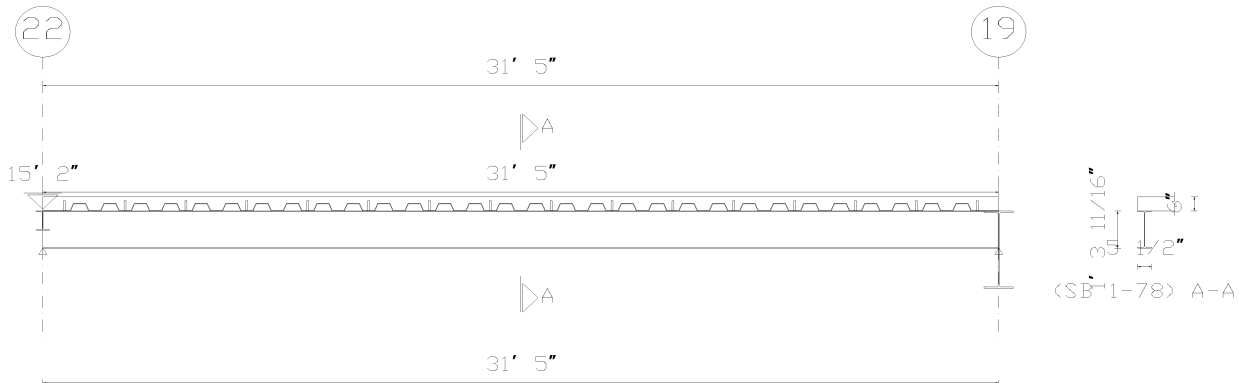
Span over limit =1.029 in

Design limit =1.029 in

Utilization Ratio =**0.600**

Pass

SB 1-78



Second Level: SB 1-78 = 1
W 16x26 A992-50 (16) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	31' 5"	•	1.000	•	1.000	•	1.000	•	1.000
support	31' 5"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	31' 5"	16	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 2' 3 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 16x26 (16)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.337	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	9.6	106.0	kip	0.091	✓ Pass
Flexure	2	75.4	272.9	kip ft	0.276	✓ Pass
Connector Resistance	2	8	16	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.067	-	in	-	-
Deflection Slab	2	0.337	1.571	in	0.215	✓ Pass
Deflection Dead	2	0.045	1.047	in	0.043	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Live	2	0.227	1.047	in	0.217	✓ Pass
Deflection Post Composite	2	0.273	1.047	in	0.260	✓ Pass
Deflection Total	2	0.677	1.571	in	0.431	✓ Pass

Construction Stage

W 16x26(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.9	106.0	kip	0.037	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	30.8	165.7	kip ft	0.186	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.067	-	in	-	-
Deflection Total	1	0.529	1.571	in	0.337	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 15' 8 1/2" - Critical

Moment, M_x = 30.8 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 3.9 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.037

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Yielding: 15' 8 1/2" - Critical

Dist of M_{rx} along member = 15' 8 1/2" ft, in

Required flexural strength, M_{rx1} = 30.8 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.186

✓ Pass

Deflection

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical



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Deflection Total - Critical

Position Total load deflection =15' 8 1/2" ft, in
Max. Total load deflection =0.529 in
Span over limit =1.571 in
Design limit =1.571 in
Utilization Ratio =0.337



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 15' 8 1/2" - Critical

Web class Compact AISC 360 Table B4.1b
h / t_w =56.800
h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in
Required major axis shear strength, V_{ry} =9.6 kip
Design shear strength =106.0 kip AISC 360 G2
Ratio =0.091



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

15' 8 1/2" Max Moment Position - Critical

Distance of M along member =15' 8 1/2" ft, in
Required flexural strength, M_x =75.4 kip ft
Design flexural strength =272.9 kip ft
Ratio =0.276



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

15' 8 1/2" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in
Maximum permitted group spacing =3' 0" ft, in
Number of shear connectors over full beam length 16
Number of shear connectors to critical point, N_a 8
Degree of shear connection =0.491
Absolute minimum degree of shear connection =0.250
Optimum amount of shear connection =0.500
Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

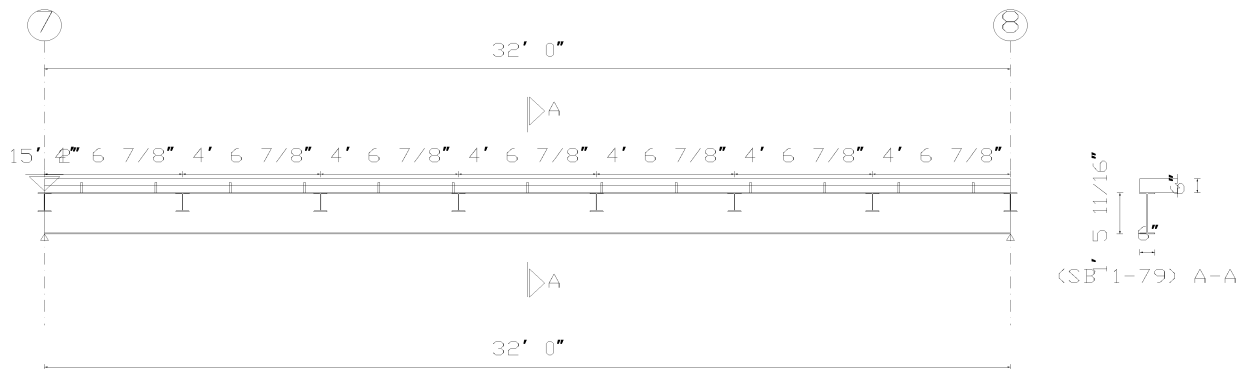
Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 993.9 in⁴
Long term inertia, I_{al} = 993.9 in⁴
Short term inertia @ partial interaction, I_{as} = 786.8 in⁴
Long term inertia @ partial interaction, I_{al} = 786.8 in⁴
Position Total load deflection = 15' 8 1/2" ft, in
Deflection with full shear connection n , δ = 0.622 in
Deflection of steel beam alone, δ_s = 1.102 in
Minimum degree of shear connection = 49.14 %
Deflection with partial shear connection, δ = 0.677 in
Span over limit = 1.571 in
Design limit = 1.571 in
Utilization Ratio = **0.431**

✓ Pass

SB 1-79



Second Level: SB 1-79 = 1
W 18x35 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 6 7/8"		1.000		1.000		1.000		1.000
member	4' 6 7/8"	•						•	
sub-beam	4' 6 7/8"		1.000		1.000		1.000		1.000
member	9' 1 3/4"	•						•	
sub-beam	4' 6 7/8"		1.000		1.000		1.000		1.000
member	13' 8 5/8"	•						•	
sub-beam	4' 6 7/8"		1.000		1.000		1.000		1.000
member	18' 3 3/8"	•						•	
sub-beam	4' 6 7/8"		1.000		1.000		1.000		1.000
member	22' 10 1/4"	•						•	
sub-beam	4' 6 7/8"		1.000		1.000		1.000		1.000
member	27' 5 1/8"	•						•	
sub-beam	4' 6 7/8"		1.000		1.000		1.000		1.000
support	32' 0"	•		•		•		•	

Connectors\LAYOUT

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing distance [ft, in]
0"	32' 0"	13	1	2' 5 17/32"

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 1/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 18x35 (13 (13))

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.652	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	26.8	159.3	kip	0.169	✓ Pass
Flexure	2	244.6	369.0	kip ft	0.663	✓ Pass
Connector Resistance	2	6	13 (13)	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.103	-	in	-	-
Deflection Slab	2	0.686	1.600	in	0.429	✓ Pass
Deflection Dead	2	0.109	1.067	in	0.102	✓ Pass
Deflection Live	2	0.541	1.067	in	0.507	✓ Pass
Deflection Post Composite	2	0.650	1.067	in	0.610	✓ Pass
Deflection Total	2	1.439	1.600	in	0.900	✓ Pass

Construction Stage

W 18x35(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	10.9	159.3	kip	0.068	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	98.5	246.2	kip ft	0.400	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.103	-	in	-	-
Deflection Total	1	1.043	1.600	in	0.652	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Flexural: Position 4' 6 7/8" - Critical



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Moment, M_x =49.2 kip ft
Elastic modulus of steel, E =29000 ksi
Minimum yield stress, F_y =50.00 ksi
Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =10.9 kip

Design shear strength =159.3 kip AISC 360 G2

Ratio =0.068



Pass

Flexure Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

LTB Flange Top: 13' 8 5/8" - 18' 3 3/8" - Critical

Dist of M_{rx1} along member =16' 0" ft, inRequired flexural strength, M_{rx1} =98.5 kip ft

Design flexural strength =246.2 kip ft AISC 360 F1, F2, F3 and F4

Ratio =0.400



Pass

Deflection

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =16' 0" ft, in

Max. Total load deflection =1.043 in

Span over limit =1.600 in

Design limit =1.600 in

Utilization Ratio =0.652



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 16' 0" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w =53.500 h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =26.8 kip

Design shear strength =159.3 kip AISC 360 G2

Ratio =0.169



Pass

Flexure



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2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

16' 0" Max Moment Position - Critical

Distance of M along member =16' 0" ft, in
Required flexural strength, M_x =244.6 kip ft
Design flexural strength =369.0 kip ft
Ratio =**0.663**



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

16' 0" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 5 17/32" ft, in
Maximum permitted group spacing =3' 0" ft, in
Number of shear connectors over full beam length 13
Number of shear connectors to critical point, N_a 6
Degree of shear connection =**0.251**
Absolute minimum degree of shear connection =**0.250**
Optimum amount of shear connection =**0.500**
Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

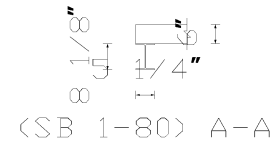
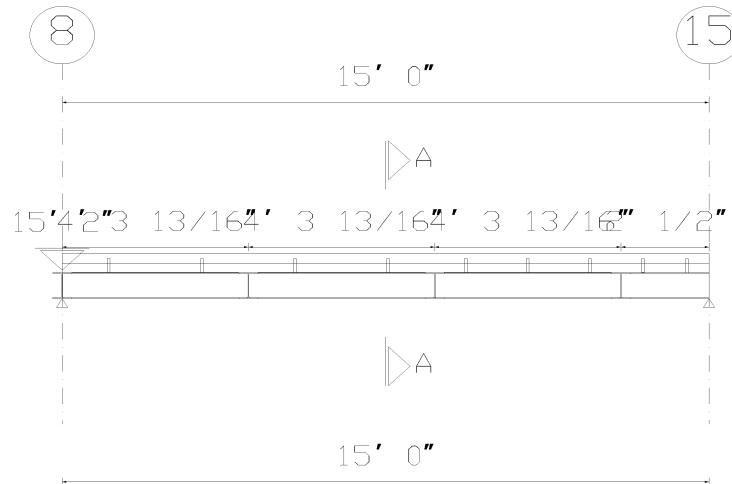
Deflection Total - Critical

Short term inertia, I_{as} =1744.6 in⁴
Long term inertia, I_{aL} =1744.6 in⁴
Short term inertia @ partial interaction, I_{as} =1128.4 in⁴
Long term inertia @ partial interaction, I_{aL} =1128.4 in⁴
Position Total load deflection =16' 0" ft, in
Deflection with full shear connection n , δ =1.218 in
Deflection of steel beam alone, δ_s =2.201 in
Minimum degree of shear connection =25.09 %
Deflection with partial shear connection, δ =1.439 in
Span over limit =1.600 in
Design limit =1.600 in
Utilization Ratio =**0.900**



Pass

SB 1-80



Second Level: SB 1-80 - 1
W 8x18 A992-50 (2, 2, 3, 2) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 3 7/8"		1.000		1.000		1.000		1.000
member	4' 3 7/8"	•						•	
sub-beam	4' 3 7/8"		1.000		1.000		1.000		1.000
member	8' 7 5/8"	•						•	
sub-beam	4' 3 7/8"		1.000		1.000		1.000		1.000
member	12' 11 1/2"	•						•	
sub-beam	2' 1/2"		1.000		1.000		1.000		1.000
support	15' 0"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing distance [ft, in]
0"	8' 7 5/8"	4	1	2' 1 59/64"
8' 7 5/8"	12' 11 1/2"	3	1	1' 5 9/32"
12' 11 1/2"	15' 0"	2	1	1' 1/4"

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 1' 10 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (2, 2, 3, 2 (9))

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.545	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-14.5	56.2	kip	0.258	✓ Pass
Flexure	2	46.0	92.5	kip ft	0.498	✓ Pass
Connector Resistance	2	2	2, 2, 3, 2 (9)	-	-	⚠ Warning
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.031	-	in	-	-
Deflection Slab	2	0.275	0.750	in	0.367	✓ Pass
Deflection Dead	2	0.030	0.500	in	0.060	✓ Pass
Deflection Live	2	0.150	0.500	in	0.300	✓ Pass
Deflection Post Composite	2	0.180	0.500	in	0.360	✓ Pass
Deflection Total	2	0.486	0.750	in	0.649	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-5.7	56.2	kip	0.102	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	22.0	63.7	kip ft	0.346	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.031	-	in	-	-
Deflection Total	1	0.409	0.750	in	0.545	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 4' 3 7/8" - Critical

Moment, M_x = 18.2 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 15' 0" - Critical

Position of V_{ry} = 15' 0" ft, in

Required major axis shear strength, V_{ry} = -5.7 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.102

✓ Pass



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Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 8' 7 5/8" - Critical

Dist of M_{rx} along member = 8' 7 5/8" ft, inRequired flexural strength, M_{rx1} = 22.0 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.346



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 7' 7 1/4" ft, in

Max. Total load deflection = 0.409 in

Span over limit = 0.750 in

Design limit = 0.750 in

Utilization Ratio = 0.545



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 8' 7 5/8" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w = 29.900h / t_w limit for plastic stress distribution = 90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 15' 0" - Critical

Position of V_{ry} = 15' 0" ft, inRequired major axis shear strength, V_{ry} = 14.5 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.258



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

4' 3 7/8" Point Load Position - Critical

Distance of M along member = 4' 3 7/8" ft, in

Required flexural strength, M_x = 46.0 kip ft

Design flexural strength = 92.5 kip ft

Ratio = 0.498



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

4' 3 7/8" Max UR Position - Critical

Layout and strength of shear connectors

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
sub-beam	2' 3 3/8"		1.000		1.000		1.000		1.000
member	2' 3 3/8"	•						•	
sub-beam	4' 3 7/8"		1.000		1.000		1.000		1.000
member	6' 7 1/8"	•						•	
sub-beam	4' 3 7/8"		1.000		1.000		1.000		1.000
support	10' 11"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing distance [ft, in]
0"	2' 3 3/8"	2	1	1' 1 43/64"
2' 3 3/8"	6' 7 1/8"	2	1	2' 1 59/64"
6' 7 1/8"	10' 11"	3	1	1' 5 9/32"

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 1' 4 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (2, 2, 3 (7))

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.211	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	10.0	56.2	kip	0.177	✓ Pass
Flexure	2	29.4	103.1	kip ft	0.285	✓ Pass
Connector Resistance	2	3	2, 2, 3 (7)	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.009	-	in	-	-
Deflection Slab	2	0.078	0.546	in	0.142	✓ Pass
Deflection Dead	2	0.010	0.364	in	0.028	✓ Pass
Deflection Live	2	0.051	0.364	in	0.141	✓ Pass
Deflection Post Composite	2	0.061	0.364	in	0.169	✓ Pass
Deflection Total	2	0.148	0.546	in	0.271	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.9	56.2	kip	0.070	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	11.6	63.7	kip ft	0.182	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.009	-	in	-	-
Deflection Total	1	0.115	0.546	in	0.211	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 2' 3 3/8" - Critical

Moment, M_x = 8.9 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 3.9 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.070

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 6' 7 1/8" - Critical

Dist of M_{rx} along member = 6' 7 1/8" ft, in

Required flexural strength, M_{rx1} = 11.6 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.182

✓ Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 5' 5 1/2" ft, in

Max. Total load deflection = 0.115 in

Span over limit = 0.546 in

Design limit = 0.546 in

Utilization Ratio = 0.211

✓ Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical



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Span 1 W 8x18 A992-50 - Critical

Position 6' 7 1/8" - Critical

Web class Compact AISC 360 Table B4.1b

 $h / t_w = 29.900$ h / t_w limit for plastic stress distribution = 90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 10.0 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.177



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

6' 7 1/8" Max Moment Position - Critical

Distance of M along member = 6' 7 1/8" ft, in

Required flexural strength, M_x = 29.4 kip ft

Design flexural strength = 103.1 kip ft

Ratio = 0.285



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

6' 7 1/8" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 1 59/64" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 7

Number of shear connectors to critical point, N_a 3

Degree of shear connection = 0.256

Absolute minimum degree of shear connection = 0.250

Optimum amount of shear connection = 0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 286.0 in⁴Long term inertia, I_{al} = 286.0 in⁴Short term inertia @ partial interaction, I_{as} = 175.3 in⁴Long term inertia @ partial interaction, I_{al} = 175.3 in⁴

Position Total load deflection = 5' 6 1/4" ft, in

Deflection with full shear connection n , δ = 0.127 inDeflection of steel beam alone, δ_s = 0.247 in

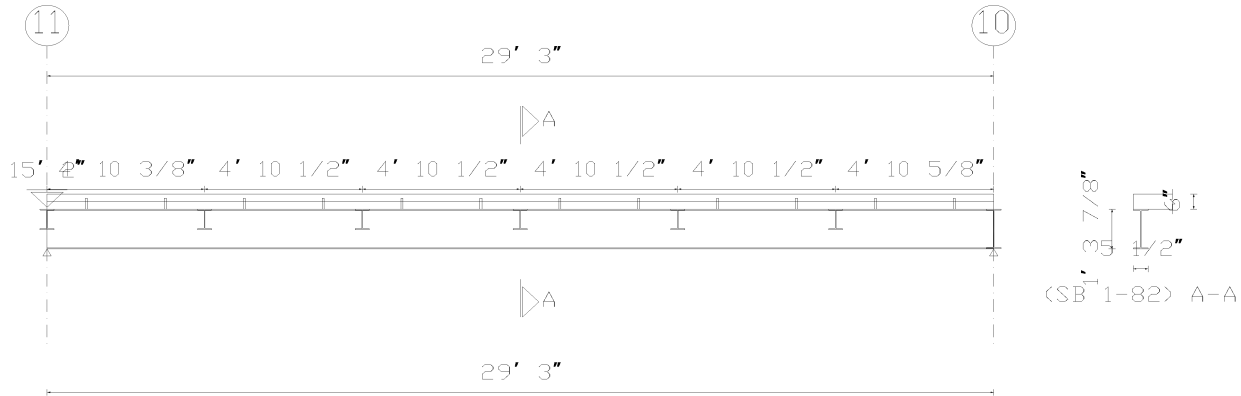
Minimum degree of shear connection = 25.59 %

Deflection with partial shear connection, δ = 0.148 in

Span over limit =0.546 in
Design limit =0.546 in
Utilization Ratio =0.271

Pass

SB 1-82



Second Level: SB 1-82 = 1
W 16x31 A992-50 (12) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 10 3/8"		1.000		1.000		1.000		1.000
member	4' 10 3/8"	•						•	
sub-beam	4' 10 1/2"		1.000		1.000		1.000		1.000
member	9' 8 7/8"	•						•	
sub-beam	4' 10 1/2"		1.000		1.000		1.000		1.000
member	14' 7 3/8"	•						•	
sub-beam	4' 10 1/2"		1.000		1.000		1.000		1.000
member	19' 5 7/8"	•						•	
sub-beam	4' 10 1/2"		1.000		1.000		1.000		1.000
member	24' 4 3/8"	•						•	
sub-beam	4' 10 5/8"		1.000		1.000		1.000		1.000
support	29' 3"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing distance [ft, in]
0"	29' 3"	12	1	2' 5 1/4"

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 3' 7 7/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement

Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi

Reinforcement for crack control or fire requirements

Type Area Yield strength
6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 16x31 (12 (12))

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.668	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	23.9	131.2	kip	0.182	✓ Pass
Flexure	2	208.5	311.3	kip ft	0.670	✓ Pass
Connector Resistance	2	6	12 (12)	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.089	-	in	-	-
Deflection Slab	2	0.648	1.462	in	0.443	✓ Pass
Deflection Dead	2	0.097	0.975	in	0.099	✓ Pass
Deflection Live	2	0.484	0.975	in	0.496	✓ Pass
Deflection Post Composite	2	0.581	0.975	in	0.596	✓ Pass
Deflection Total	2	1.318	1.462	in	0.901	✓ Pass

Construction Stage

W 16x31(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	9.6	131.2	kip	0.073	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	83.1	202.5	kip ft	0.410	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.089	-	in	-	-
Deflection Total	1	0.977	1.462	in	0.668	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Flexural: Position 4' 10 3/8" - Critical

Moment, M_x =46.1 kip ftElastic modulus of steel, E =29000 ksiMinimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =9.6 kip

Design shear strength =131.2 kip AISC 360 G2



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Ratio **=0.073**

Pass

Flexure Major

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Yielding: 14' 7 3/8" - Critical

Dist of M_{rx} along member =14' 7 3/8" ft, inRequired flexural strength, M_{rx1} =83.1 kip ft

Design flexural strength =202.5 kip ft AISC 360 F1, F2 and F3

Ratio **=0.410**

Pass

Deflection

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =14' 7 3/8" ft, in

Max. Total load deflection =0.977 in

Span over limit =1.462 in

Design limit =1.462 in

Utilization Ratio **=0.668**

Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

Position 14' 7 3/8" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w **=51.600**h / t_w limit for plastic stress distribution **=90.553**

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =23.9 kip

Design shear strength =131.2 kip AISC 360 G2

Ratio **=0.182**

Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

14' 7 3/8" Max Moment Position - Critical

Distance of M along member =14' 7 3/8" ft, in

Required flexural strength, M_x =208.5 kip ft

Design flexural strength =311.3 kip ft

Ratio **=0.670**

Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

14' 7 3/8" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, $s = 2' 5 1/4"$ ft, in

Maximum permitted group spacing $= 3' 0"$ ft, in

Number of shear connectors over full beam length 12

Number of shear connectors to critical point, $N_a = 6$

Degree of shear connection $= 0.283$

Absolute minimum degree of shear connection $= 0.250$

Optimum amount of shear connection $= 0.500$

Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

Deflection Total - Critical

Short term inertia, $I_{as} = 1335.3 \text{ in}^4$

Long term inertia, $I_{al} = 1335.3 \text{ in}^4$

Short term inertia @ partial interaction, $I_{as} = 885.9 \text{ in}^4$

Long term inertia @ partial interaction, $I_{al} = 885.9 \text{ in}^4$

Position Total load deflection $= 14' 7 3/8"$ ft, in

Deflection with full shear connection $n, \delta = 1.130 \text{ in}$

Deflection of steel beam alone, $\delta_s = 2.077 \text{ in}$

Minimum degree of shear connection $= 28.31 \%$

Deflection with partial shear connection, $\delta = 1.318 \text{ in}$

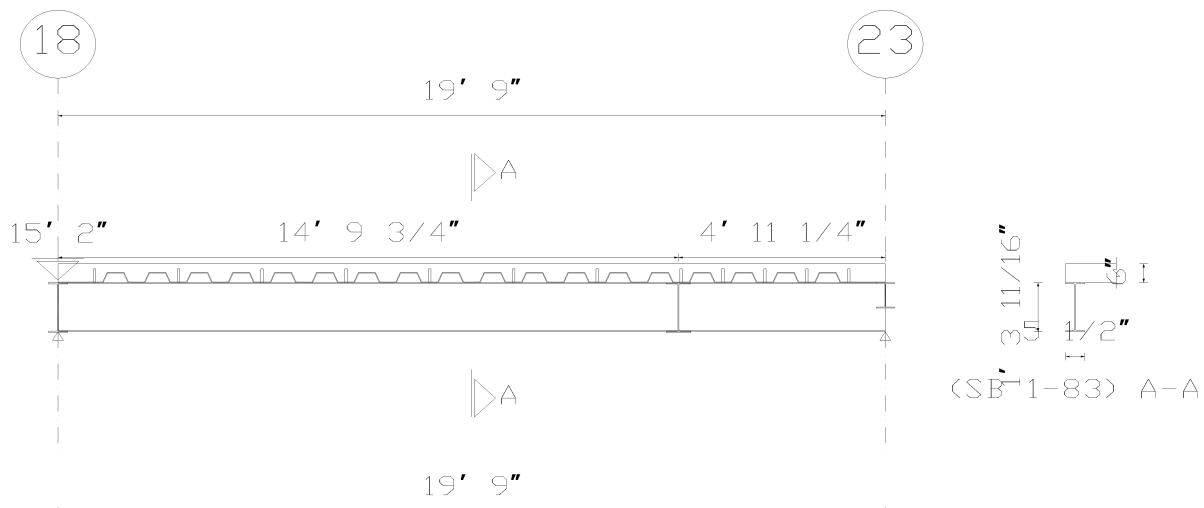
Span over limit $= 1.462 \text{ in}$

Design limit $= 1.462 \text{ in}$

Utilization Ratio $= 0.901$

✓ Pass

SB 1-83



Second Level: SB 1-83 - 1
 W 16x26 A992-50 (12) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	14' 9 3/4"	•	1.000		1.000		1.000		1.000
member	14' 9 3/4"	•						•	
sub-beam	4' 11 1/4"	•	1.000		1.000		1.000		1.000
support	19' 9"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength

AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	13' 4 1/2"	7	1	2
14' 4 1/2"	19' 9"	5	1	1

Decking

Manufacturer Name Gauge Yield strength

VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'

6" ft, in 2' 5 1/4" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements

Type Area Yield strength Type Area Yield strength

Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 16x26 (12)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.609	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-48.5	106.0	kip	0.458	✓ Pass
Flexure	2	232.1	241.4	kip ft	0.961	✓ Pass
Connector Resistance	2	5	12	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.065	-	in	-	-
Deflection Slab	2	0.361	0.987	in	0.365	✓ Pass
Deflection Dead	2	0.057	0.658	in	0.087	✓ Pass
Deflection Live	2	0.253	0.658	in	0.385	✓ Pass
Deflection Post Composite	2	0.310	0.658	in	0.471	✓ Pass
Deflection Total	2	0.736	0.987	in	0.745	✓ Pass

Construction Stage

W 16x26(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-21.1	106.0	kip	0.199	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	101.0	165.7	kip ft	0.609	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.065	-	in	-	-
Deflection Total	1	0.560	0.987	in	0.567	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 10' 11 1/2" - Critical

Moment, M_x = 80.2 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Position 19' 9" - Critical

Position of V_{ry} = 19' 9" ft, in

Required major axis shear strength, V_{ry} = -21.1 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.199



Pass

Flexure Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Yielding: 14' 9 3/4" - Critical

Dist of M_{rx} along member = 14' 9 3/4" ft, in

Required flexural strength, M_{rx1} = 101.0 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.609



Pass

Deflection

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 10' 11 1/2" ft, in

Max. Total load deflection = 0.560 in

Span over limit = 0.987 in

Design limit = 0.987 in

Utilization Ratio = 0.567



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 14' 9 3/4" - Critical

Web class Compact AISC 360 Table B4.1b



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 $h / t_w = 56.800$ h / t_w limit for plastic stress distribution = 90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 19' 9" - Critical

Position of V_{ry} = 19' 9" ft, inRequired major axis shear strength, V_{ry} = 48.5 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.458



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

14' 9 3/4" Max Moment Position - Critical

Distance of M along member = 14' 9 3/4" ft, in

Required flexural strength, M_x = 232.1 kip ft

Design flexural strength = 241.4 kip ft

Ratio = 0.961



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

14' 9 3/4" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 12

Number of shear connectors to critical point, N_a 5

Degree of shear connection = 0.289

Absolute minimum degree of shear connection = 0.250

Optimum amount of shear connection = 0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 1011.9 in⁴Long term inertia, I_{al} = 1011.9 in⁴Short term inertia @ partial interaction, I_{as} = 683.0 in⁴Long term inertia @ partial interaction, I_{al} = 683.0 in⁴

Position Total load deflection = 11' 1" ft, in

Deflection with full shear connection n , δ = 0.642 inDeflection of steel beam alone, δ_s = 1.102 in

Minimum degree of shear connection = 28.87 %

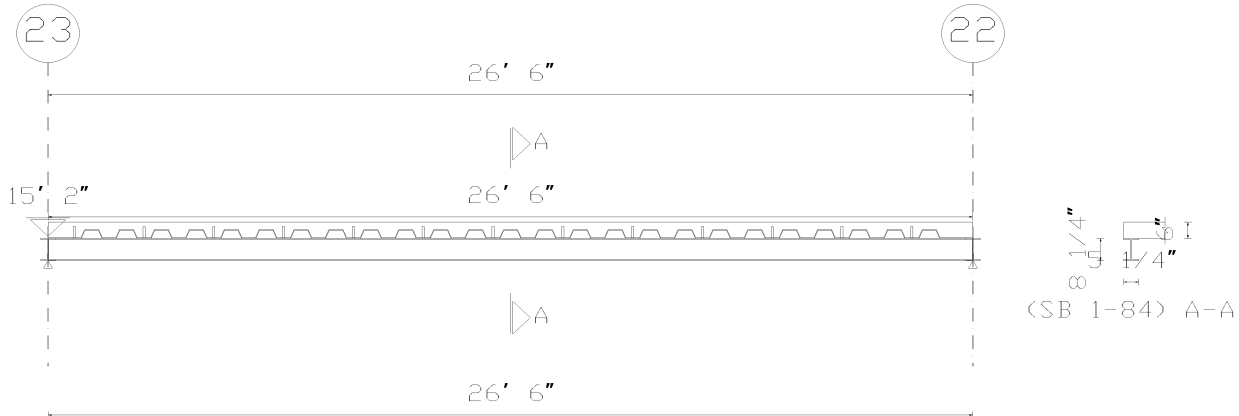
Deflection with partial shear connection, δ = 0.736 in

Span over limit = 0.987 in

Design limit = 0.987 in

Utilization Ratio = 0.745

Pass
SB 1-84



Second Level: SB 1-84 = 1
W 8x21 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	26' 6"	•	1.000		1.000		1.000		1.000
support	26' 6"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	25' 3"	13	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 2' 5 1/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x21 (13)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.829	Pass
Classification	2	Compact	-	-	-	Pass
Vertical Shear	2	8.5	62.1	kip	0.137	Pass
Flexure	2	56.3	135.2	kip ft	0.417	Pass
Connector Resistance	2	6	13	-	-	Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.107	-	in	-	-
Deflection Slab	2	0.723	1.325	in	0.546	✓ Pass
Deflection Dead	2	0.075	0.883	in	0.085	✓ Pass
Deflection Live	2	0.373	0.883	in	0.423	✓ Pass
Deflection Post Composite	2	0.448	0.883	in	0.507	✓ Pass
Deflection Total	2	1.279	1.325	in	0.965	✓ Pass

Construction Stage

W 8x21(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.4	62.1	kip	0.055	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	22.6	76.5	kip ft	0.295	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.107	-	in	-	-
Deflection Total	1	1.099	1.325	in	0.829	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x21 A992-50 - Critical

Flexural: Position 13' 3" - Critical

Moment, M_x = 22.6 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x21 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 3.4 kip

Design shear strength = 62.1 kip AISC 360 G2

Ratio = 0.055

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 8x21 A992-50 - Critical

Yielding: 13' 3" - Critical

Dist of M_{rx} along member = 13' 3" ft, in

Required flexural strength, M_{rx1} = 22.6 kip ft

Design flexural strength = 76.5 kip ft AISC 360 F1, F2 and F3

Ratio = 0.295



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Pass

Deflection

1 Construction Stage

Span 1 W 8x21 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =13' 3" ft, in

Max. Total load deflection =1.099 in

Span over limit =1.325 in

Design limit =1.325 in

Utilization Ratio =0.829



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

Position 13' 3" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w =27.500h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =8.5 kip

Design shear strength =62.1 kip AISC 360 G2

Ratio =0.137



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

13' 3" Max Moment Position - Critical

Distance of M along member =13' 3" ft, in

Required flexural strength, M_x =56.3 kip ft

Design flexural strength =135.2 kip ft

Ratio =0.417



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

13' 3" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 13

Number of shear connectors to critical point, N_a 6

Degree of shear connection =0.348

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 382.9 in⁴

Long term inertia, I_{al} = 382.9 in⁴

Short term inertia @ partial interaction, I_{as} = 256.7 in⁴

Long term inertia @ partial interaction, I_{al} = 256.7 in⁴

Position Total load deflection = 13' 3" ft, in

Deflection with full shear connection n , δ = 1.135 in

Deflection of steel beam alone, δ_s = 2.326 in

Minimum degree of shear connection = 34.80 %

Deflection with partial shear connection, δ = 1.279 in

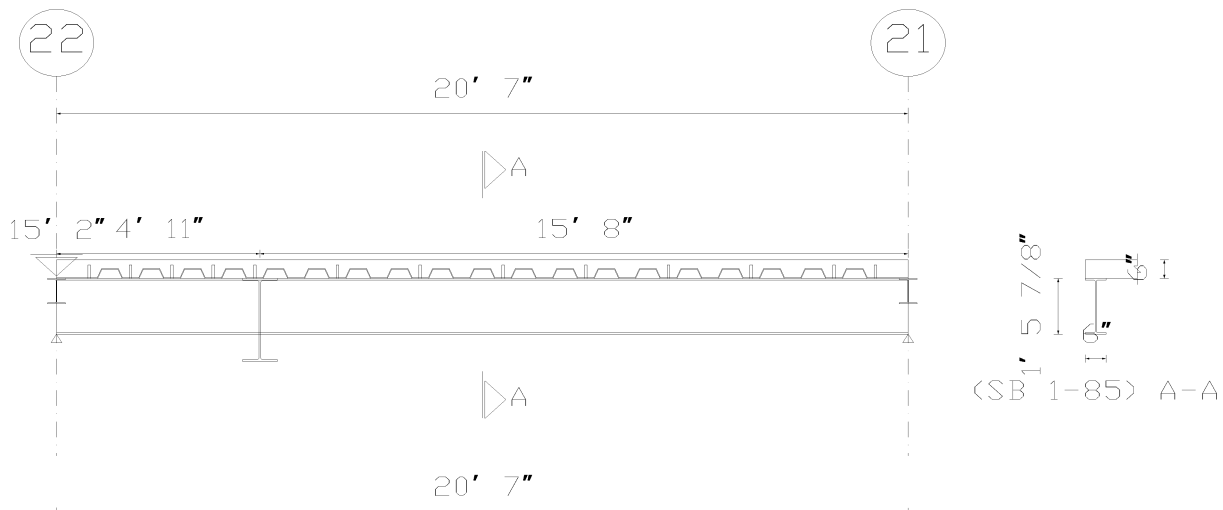
Span over limit = 1.325 in

Design limit = 1.325 in

Utilization Ratio = 0.965

Pass

SB 1-85



Second Level: SB 1-85 = 1

W 18x40 A992-50 (18) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 11"	•	1.000		1.000		1.000		1.000
member	4' 11"	•						•	
sub-beam	15' 8"	•	1.000		1.000		1.000		1.000
support	20' 7"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	3' 3 1/2"	6	2	1
3' 3 1/2"	5' 3 1/2"	2	1	1
6' 3 1/2"	17' 3 1/2"	6	1	2
18' 3 1/2"	20' 7"	4	2	1

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 2' 5 1/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 18x40 (18)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.682	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	84.6	169.2	kip	0.500	✓ Pass
Flexure	2	409.0	409.0	kip ft	1.000	✓ Pass
Connector Resistance	2	8	18	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.070	-	in	-	-
Deflection Slab	2	0.372	1.029	in	0.361	✓ Pass
Deflection Dead	2	0.064	0.686	in	0.093	✓ Pass
Deflection Live	2	0.227	0.686	in	0.331	✓ Pass
Deflection Post Composite	2	0.291	0.686	in	0.424	✓ Pass
Deflection Total	2	0.733	1.029	in	0.712	✓ Pass

Construction Stage

W 18x40(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	41.5	169.2	kip	0.245	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	200.5	294.0	kip ft	0.682	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.070	-	in	-	-
Deflection Total	1	0.580	1.029	in	0.564	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage



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Span 1 W 18x40 A992-50 - Critical

Flexural: Position 0" - Critical

Moment, M_x = 0.1 kip ftElastic modulus of steel, E = 29000 ksiMinimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 41.5 kip

Design shear strength = 169.2 kip AISC 360 G2

Ratio = 0.245



Pass

Flexure Major

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Yielding: 4' 11" - Critical

Dist of M_{rx} along member = 4' 11" ft, inRequired flexural strength, M_{rx1} = 200.5 kip ft

Design flexural strength = 294.0 kip ft AISC 360 F1, F2 and F3

Ratio = 0.682



Pass

Deflection

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 9' 1/8" ft, in

Max. Total load deflection = 0.580 in

Span over limit = 1.029 in

Design limit = 1.029 in

Utilization Ratio = 0.564



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

Position 4' 11" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w = 50.900 h / t_w limit for plastic stress distribution = 90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 84.6 kip

Design shear strength = 169.2 kip AISC 360 G2

Ratio = 0.500



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Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

4' 11" Max Moment Position - Critical

Distance of M along member = 4' 11" ft, in

Required flexural strength, M_x = 409.0 kip ft

Design flexural strength = 409.0 kip ft

Ratio = **1.000**

Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

4' 11" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 18

Number of shear connectors to critical point, N_a 8Degree of shear connection = **0.412**Absolute minimum degree of shear connection = **0.250**Optimum amount of shear connection = **0.500**

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 1671.8 in⁴Long term inertia, I_{al} = 1671.8 in⁴Short term inertia @ partial interaction, I_{as} = 1292.1 in⁴Long term inertia @ partial interaction, I_{al} = 1292.1 in⁴

Position Total load deflection = 8' 10 1/8" ft, in

Deflection with full shear connection n , δ = 0.673 inDeflection of steel beam alone, δ_s = 1.029 in

Minimum degree of shear connection = 41.18 %

Deflection with partial shear connection, δ = 0.733 in

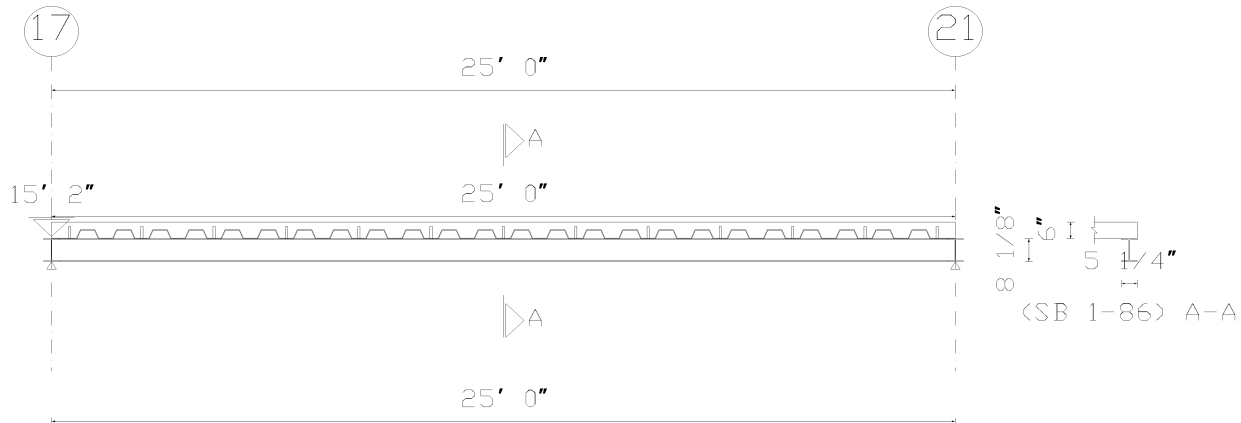
Span over limit = 1.029 in

Design limit = 1.029 in

Utilization Ratio = **0.712**

Pass

SB 1-86



Second Level: SB 1-86 - 1
W 8x18 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	25' 0"	•	1.000		1.000		1.000		1.000
support	25' 0"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	25' 0"	13	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 2' 5 1/4" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (13)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.837	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	8.0	56.2	kip	0.142	✓ Pass
Flexure	2	50.0	121.0	kip ft	0.413	✓ Pass
Connector Resistance	2	6	13		-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.088	-	in	-	

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Slab	2	0.699	1.250	in	0.559	✓ Pass
Deflection Dead	2	0.065	0.833	in	0.079	✓ Pass
Deflection Live	2	0.327	0.833	in	0.393	✓ Pass
Deflection Post Composite	2	0.393	0.833	in	0.471	✓ Pass
Deflection Total	2	1.180	1.250	in	0.944	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.2	56.2	kip	0.057	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	19.8	63.7	kip ft	0.311	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.088	-	in	-	-
Deflection Total	1	1.046	1.250	in	0.837	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 12' 6" - Critical

Moment, M_x = 19.8 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 3.2 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.057

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 12' 6" - Critical

Dist of M_{rx} along member = 12' 6" ft, in

Required flexural strength, M_{rx1} = 19.8 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.311

✓ Pass



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Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =12' 6" ft, in
Max. Total load deflection =1.046 in
Span over limit =1.250 in
Design limit =1.250 in
Utilization Ratio =**0.837**



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 12' 6" - Critical

Web class Compact AISC 360 Table B4.1b
h / t_w =**29.900**
h / t_w limit for plastic stress distribution =**90.553**

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in
Required major axis shear strength, V_{ry} =8.0 kip
Design shear strength =56.2 kip AISC 360 G2
Ratio =**0.142**



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

12' 6" Max Moment Position - Critical

Distance of M along member =12' 6" ft, in
Required flexural strength, M_x =50.0 kip ft
Design flexural strength =121.0 kip ft
Ratio =**0.413**



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

12' 6" Max Moment and UR Position - Critical

Layout and strength of shear connectors
Maximum group spacing, s =2' 0" ft, in
Maximum permitted group spacing =3' 0" ft, in
Number of shear connectors over full beam length 13
Number of shear connectors to critical point, N_a 6
Degree of shear connection =**0.393**
Absolute minimum degree of shear connection =**0.250**
Optimum amount of shear connection =**0.500**
Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

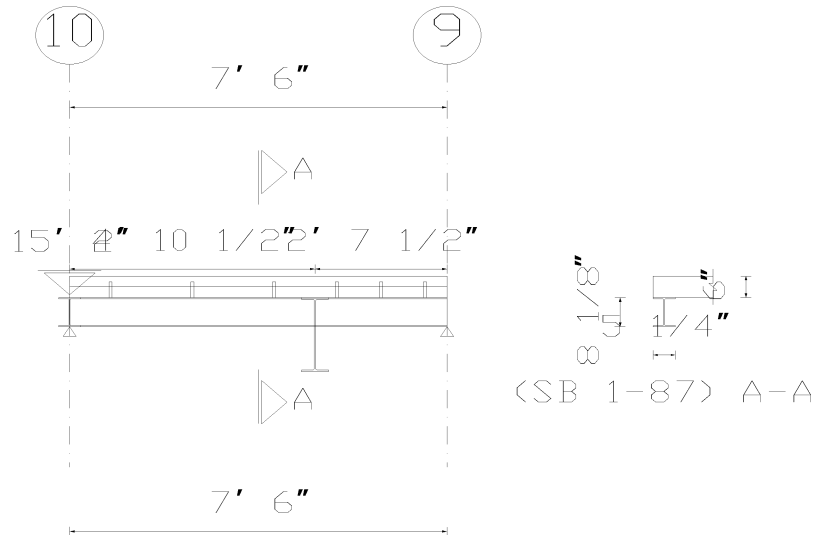
Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as}	=335.6 in ⁴
Long term inertia, I_{al}	=335.6 in ⁴
Short term inertia @ partial interaction, I_{as}	=233.5 in ⁴
Long term inertia @ partial interaction, I_{al}	=233.5 in ⁴
Position Total load deflection	=12' 6" ft, in
Deflection with full shear connection n, δ	=1.065 in
Deflection of steel beam alone, δ_s	=2.232 in
Minimum degree of shear connection	=39.31 %
Deflection with partial shear connection, δ	=1.180 in
Span over limit	=1.250 in
Design limit	=1.250 in
Utilization Ratio	=0.944

✓ Pass

SB 1-87



Second Level: SB 1-87 = 1
W 8x18 A992-50 (3, 3) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 10 1/2"		1.000		1.000		1.000		1.000
member	4' 10 1/2"	•						•	
sub-beam	2' 7 1/2"		1.000		1.000		1.000		1.000
support	7' 6"	•		•		•		•	

Connectors/Layout

Name	Diameter	As welded height	Specified ultimate tensile strength
AISC 3/4" x 4 3/8"	3/4"	4"	65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing distance [ft, in]
0"	4' 10 1/2"	3	1	1' 7 1/2"
4' 10 1/2"	7' 6"	3	1	10 1/2"

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 11 3/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (3, 3 (6))

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.285	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-17.1	56.2	kip	0.305	✓ Pass
Flexure	2	44.9	101.8	kip ft	0.441	✓ Pass
Connector Resistance	2	3	3, 3 (6)	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.008	-	in	-	-
Deflection Slab	2	0.048	0.375	in	0.128	✓ Pass
Deflection Dead	2	0.007	0.250	in	0.027	✓ Pass
Deflection Live	2	0.034	0.250	in	0.137	✓ Pass
Deflection Post Composite	2	0.041	0.250	in	0.166	✓ Pass
Deflection Total	2	0.097	0.375	in	0.260	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-6.9	56.2	kip	0.124	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	18.2	63.7	kip ft	0.285	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.008	-	in	-	-
Deflection Total	1	0.074	0.375	in	0.197	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical



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Flexural: Position 4' 2 3/8" - Critical

Moment, M_x =15.6 kip ftElastic modulus of steel, E =29000 ksiMinimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 7' 6" - Critical

Position of V_{ry} =7' 6" ft, inRequired major axis shear strength, V_{ry} =-6.9 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.124



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 4' 10 1/2" - Critical

Dist of M_{rx} along member =4' 10 1/2" ft, inRequired flexural strength, M_{rx1} =18.2 kip ft

Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3

Ratio =0.285



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =4' 2 3/8" ft, in

Max. Total load deflection =0.074 in

Span over limit =0.375 in

Design limit =0.375 in

Utilization Ratio =0.197



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 4' 10 1/2" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w =29.900 h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 6" - Critical

Position of V_{ry} =7' 6" ft, inRequired major axis shear strength, V_{ry} =-17.1 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.305



Pass



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Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

4' 10 1/2" Max Moment Position - Critical

Distance of M along member = 4' 10 1/2" ft, in

Required flexural strength, M_x = 44.9 kip ft

Design flexural strength = 101.8 kip ft

Ratio = **0.441**

Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

4' 10 1/2" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 1' 7 1/2" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 6

Number of shear connectors to critical point, N_a 3Degree of shear connection = **0.371**Absolute minimum degree of shear connection = **0.250**Optimum amount of shear connection = **0.500**

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 250.2 in⁴Long term inertia, I_{aL} = 250.2 in⁴Short term inertia @ partial interaction, I_{as} = 176.6 in⁴Long term inertia @ partial interaction, I_{aL} = 176.6 in⁴

Position Total load deflection = 4' 5 3/8" ft, in

Deflection with full shear connection n , δ = 0.088 inDeflection of steel beam alone, δ_s = 0.155 in

Minimum degree of shear connection = 37.12 %

Deflection with partial shear connection, δ = 0.097 in

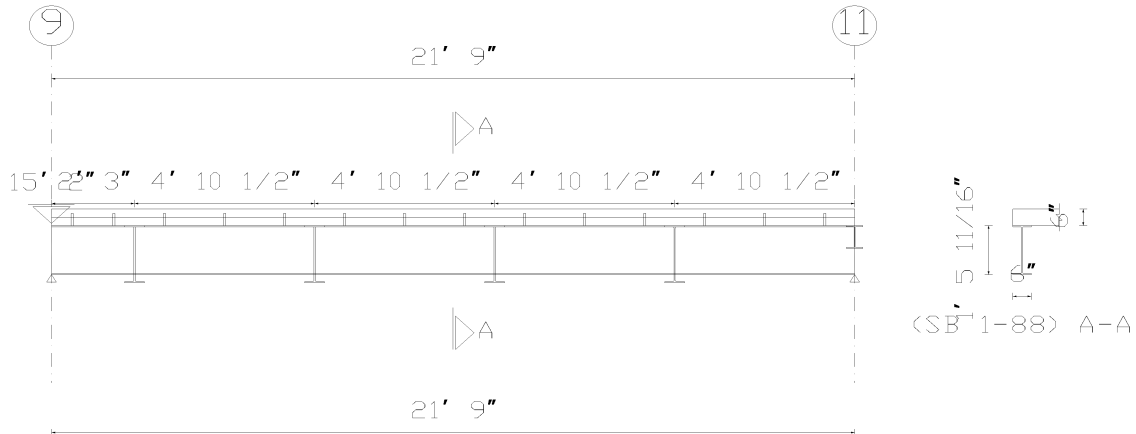
Span over limit = 0.375 in

Design limit = 0.375 in

Utilization Ratio = **0.260**

Pass

SB 1-88



Second Level: SB 1-88 - 1
W 18x35 A992-50 (2, 3, 3, 3, 3) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	2' 3"		1.000		1.000		1.000		1.000
member	2' 3"	•						•	
sub-beam	4' 10 1/2"		1.000		1.000		1.000		1.000
member	7' 1 1/2"	•						•	
sub-beam	4' 10 1/2"		1.000		1.000		1.000		1.000
member	12' 0"	•						•	
sub-beam	4' 10 1/2"		1.000		1.000		1.000		1.000
member	16' 10 1/2"	•						•	
sub-beam	4' 10 1/2"		1.000		1.000		1.000		1.000
support	21' 9"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing distance [ft, in]
0"	2' 3"	2	1	1' 1 1/2"
2' 3"	21' 9"	12	1	1' 7 1/2"

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 2' 8 5/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 18x35 (2, 3, 3, 3, 3 (14))

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.589	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	51.5	159.3	kip	0.323	✓ Pass
Flexure	2	281.9	367.1	kip ft	0.768	✓ Pass
Connector Resistance	2	6	2, 3, 3, 3, 3 (14)	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.077	-	in	-	-
Deflection Slab	2	0.412	1.087	in	0.378	✓ Pass
Deflection Dead	2	0.071	0.725	in	0.098	✓ Pass
Deflection Live	2	0.277	0.725	in	0.382	✓ Pass
Deflection Post Composite	2	0.348	0.725	in	0.480	✓ Pass
Deflection Total	2	0.836	1.087	in	0.769	✓ Pass

Construction Stage

W 18x35(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	24.1	159.3	kip	0.151	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	131.8	249.4	kip ft	0.528	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.077	-	in	-	-
Deflection Total	1	0.641	1.087	in	0.589	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Flexural: Position 2' 3" - Critical

Moment, M_x = 54.1 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 24.1 kip

Design shear strength = 159.3 kip AISC 360 G2

Ratio = 0.151



Pass

Flexure Major

1 Construction Stage



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Span 1 W 18x35 A992-50 - Critical

Yielding: 12' 0" - Critical

Dist of M_{rx} along member = 12' 0" ft, in
Required flexural strength, M_{rx1} = 131.8 kip ft
Design flexural strength = 249.4 kip ft AISC 360 F1, F2 and F3
Ratio = **0.528**



Pass

Deflection

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 10' 10 1/2" ft, in
Max. Total load deflection = 0.641 in
Span over limit = 1.087 in
Design limit = 1.087 in
Utilization Ratio = **0.589**



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 12' 0" - Critical

Web class Compact AISC 360 Table B4.1b
 h / t_w = **53.500**
 h / t_w limit for plastic stress distribution = **90.553**

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in
Required major axis shear strength, V_{ry} = 51.5 kip
Design shear strength = 159.3 kip AISC 360 G2
Ratio = **0.323**



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

12' 0" Max Moment Position - Critical

Distance of M along member = 12' 0" ft, in
Required flexural strength, M_x = 281.9 kip ft
Design flexural strength = 367.1 kip ft
Ratio = **0.768**



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

12' 0" Max Moment and UR Position - Critical

Layout and strength of shear connectors
Maximum group spacing, s = 1' 7 1/2" ft, in
Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 14
Number of shear connectors to critical point, N_a 6
Degree of shear connection =0.259
Absolute minimum degree of shear connection =0.250
Optimum amount of shear connection =0.500
Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

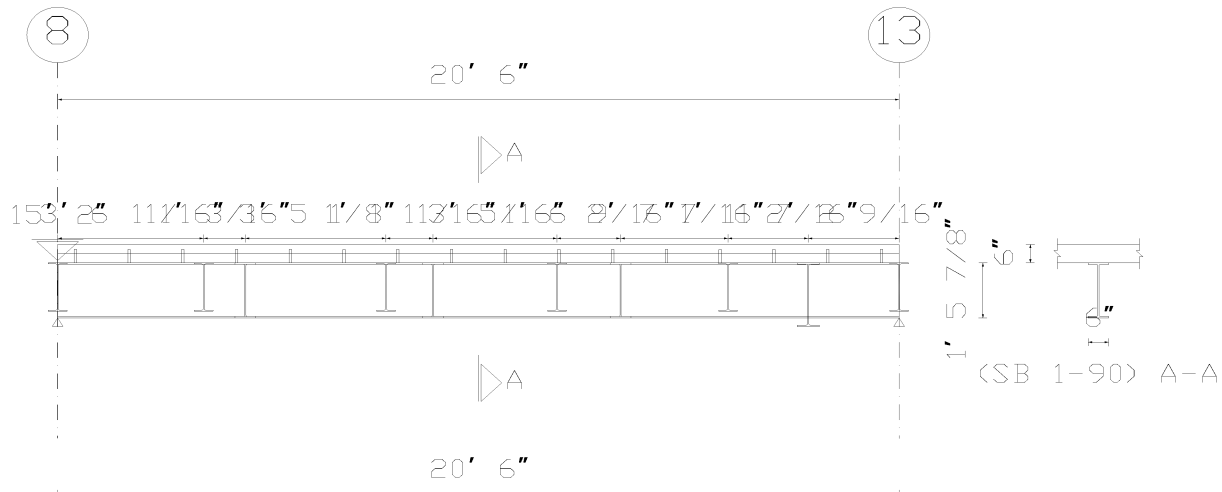
Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} =1589.1 in⁴
Long term inertia, I_{aL} =1589.1 in⁴
Short term inertia @ partial interaction, I_{as} =1059.1 in⁴
Long term inertia @ partial interaction, I_{aL} =1059.1 in⁴
Position Total load deflection =10' 11" ft, in
Deflection with full shear connection n , δ =0.728 in
Deflection of steel beam alone, δ_s =1.185 in
Minimum degree of shear connection =25.89 %
Deflection with partial shear connection, δ =0.836 in
Span over limit =1.087 in
Design limit =1.087 in
Utilization Ratio =0.769

✓ Pass

SB 1-90



Second Level: SB 1-90 = 1
W 18x40 A992-50 (16) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	3' 6 3/4"		1.000		1.000		1.000		1.000
member	3' 6 3/4"	•						•	

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
sub-beam	1' 1/8"		1.000		1.000		1.000		1.000
member	4' 6 7/8"	•						•	
sub-beam	3' 5 1/8"		1.000		1.000		1.000		1.000
member	8' 0"	•						•	
sub-beam	1' 1 3/4"		1.000		1.000		1.000		1.000
member	9' 1 3/4"	•						•	
sub-beam	3' 1/4"		1.000		1.000		1.000		1.000
member	12' 2"	•						•	
sub-beam	1' 6 5/8"		1.000		1.000		1.000		1.000
member	13' 8 5/8"	•						•	
sub-beam	2' 7 3/8"		1.000		1.000		1.000		1.000
member	16' 4"	•						•	
sub-beam	1' 11 3/8"		1.000		1.000		1.000		1.000
member	18' 3 3/8"	•						•	
sub-beam	2' 2 5/8"		1.000		1.000		1.000		1.000
support	20' 6"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing distance [ft, in]
0"	20' 6"	16	1	1' 3 45/64"

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 5' 1 5/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 18x40 (16 (16))

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.671	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-67.9	169.2	kip	0.401	✓ Pass
Flexure	2	376.0	433.3	kip ft	0.868	✓ Pass
Connector Resistance	2	7	16 (16)		-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.070	-	in	-	-
Deflection Slab	2	0.451	1.025	in	0.440	✓ Pass
Deflection Dead	2	0.073	0.683	in	0.107	✓ Pass
Deflection Live	2	0.251	0.683	in	0.367	✓ Pass
Deflection Post Composite	2	0.324	0.683	in	0.475	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Total	2	0.845	1.025	in	0.824	✓ Pass

Construction Stage

W 18x40(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-33.8	169.2	kip	0.200	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	186.8	294.0	kip ft	0.635	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.070	-	in	-	-
Deflection Total	1	0.688	1.025	in	0.671	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Flexural: Position 3' 6 3/4" - Critical

Moment, M_x =106.5 kip ft

Elastic modulus of steel, E =29000 ksi

Minimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Position 20' 6" - Critical

Position of V_{ry} =20' 6" ft, in

Required major axis shear strength, V_{ry} =-33.8 kip

Design shear strength =169.2 kip AISC 360 G2

Ratio =0.200

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Yielding: 9' 1 3/4" - Critical

Dist of M_{rx} along member =9' 1 3/4" ft, in

Required flexural strength, M_{rx1} =186.8 kip ft

Design flexural strength =294.0 kip ft AISC 360 F1, F2 and F3

Ratio =0.635

✓ Pass

Deflection

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =10' 2 7/8" ft, in



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Max. Total load deflection =0.688 in
Span over limit =1.025 in
Design limit =1.025 in
Utilization Ratio =0.671



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

Position 9' 1 3/4" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w =50.900h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

Position 20' 6" - Critical

Position of V_{ry} =20' 6" ft, inRequired major axis shear strength, V_{ry} =67.9 kip

Design shear strength =169.2 kip AISC 360 G2

Ratio =0.401



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

9' 1 3/4" Max Moment Position - Critical

Distance of M along member =9' 1 3/4" ft, in

Required flexural strength, M_x =376.0 kip ft

Design flexural strength =433.3 kip ft

Ratio =0.868



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

9' 1 3/4" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =1' 3 45/64" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 16

Number of shear connectors to critical point, N_a 7

Degree of shear connection =0.256

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

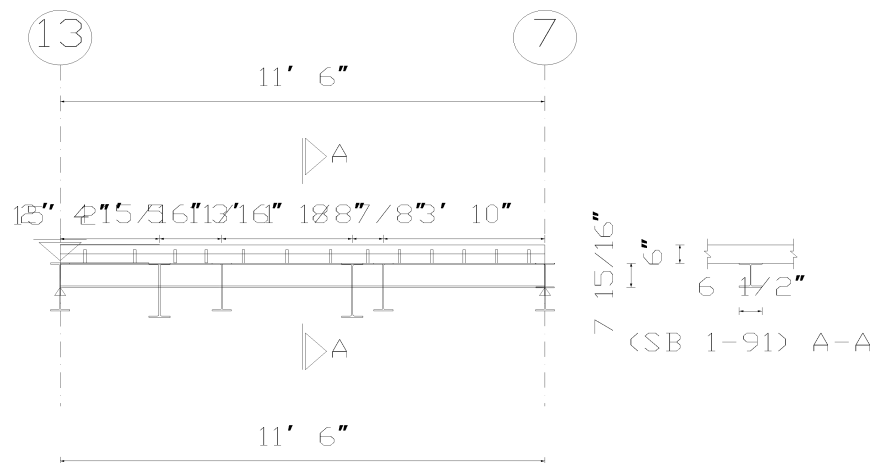
Deflection Total - Critical

Short term inertia, I_{as} =2098.6 in⁴Long term inertia, I_{al} =2098.6 in⁴

Short term inertia @ partial interaction, I_{as} =1363.5 in⁴
Long term inertia @ partial interaction, I_{al} =1363.5 in⁴
Position Total load deflection =10' 2 1/2" ft, in
Deflection with full shear connection n , δ =0.742 in
Deflection of steel beam alone, δ_s =1.207 in
Minimum degree of shear connection =25.55 %
Deflection with partial shear connection, δ =0.845 in
Span over limit =1.025 in
Design limit =1.025 in
Utilization Ratio =**0.824**

✓ Pass

SB 1-91



Second Level: SB 1-91 = 1

W 8x24 A992-50 (2, 2, 3, 1, 5) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	2' 4 1/4"		1.000		1.000		1.000		1.000
member	2' 4 1/4"	•						•	
sub-beam	1' 5 3/4"		1.000		1.000		1.000		1.000
member	3' 10"	•						•	
sub-beam	3' 1 1/8"		1.000		1.000		1.000		1.000
member	6' 11 1/8"	•						•	
sub-beam	8' 7/8"		1.000		1.000		1.000		1.000
member	7' 8"	•						•	
sub-beam	3' 10"		1.000		1.000		1.000		1.000
support	11' 6"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing distance [ft, in]
0"	2' 4 1/4"	2	1	1' 2 9/64"

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing distance [ft, in]
2' 4 1/4"	3' 10"	2	1	8 55/64"
3' 10"	6' 11 1/8"	3	1	1' 3/8"
6' 11 1/8"	7' 8"	1	1	8 55/64"
7' 8"	11' 6"	5	1	9 13/64"

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 2' 10 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x24 (2, 2, 3, 1, 5 (13))

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.846	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	39.6	58.3	kip	0.679	✓ Pass
Flexure	2	118.0	137.6	kip ft	0.858	✓ Pass
Connector Resistance	2	4	2, 2, 3, 1, 5 (13)	-	-	⚠ Warning
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.049	-	in	-	-
Deflection Slab	2	0.319	0.575	in	0.555	✓ Pass
Deflection Dead	2	0.035	0.383	in	0.091	✓ Pass
Deflection Live	2	0.153	0.383	in	0.400	✓ Pass
Deflection Post Composite	2	0.188	0.383	in	0.492	✓ Pass
Deflection Total	2	0.556	0.575	in	0.968	✓ Pass

Construction Stage

W 8x24(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	17.2	58.3	kip	0.295	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	57.2	86.6	kip ft	0.660	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.049	-	in	-	-
Deflection Total	1	0.486	0.575	in	0.846	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification



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1 Construction Stage

Span 1 W 8x24 A992-50 - Critical

Flexural: Position 2' 4 1/4" - Critical

Moment, M_x =40.5 kip ftElastic modulus of steel, E =29000 ksiMinimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x24 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =17.2 kip

Design shear strength =58.3 kip AISC 360 G2

Ratio =0.295



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x24 A992-50 - Critical

Yielding: 6' 11 1/8" - Critical

Dist of M_{rx} along member =6' 11 1/8" ft, inRequired flexural strength, M_{rx1} =57.2 kip ft

Design flexural strength =86.6 kip ft AISC 360 F1, F2 and F3

Ratio =0.660



Pass

Deflection

1 Construction Stage

Span 1 W 8x24 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =5' 9" ft, in

Max. Total load deflection =0.486 in

Span over limit =0.575 in

Design limit =0.575 in

Utilization Ratio =0.846



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x24 A992-50 - Critical

Position 6' 11 1/8" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w =25.900 h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x24 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =39.6 kip

Design shear strength =58.3 kip AISC 360 G2



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Ratio =0.679



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x24 A992-50 - Critical

3' 10" Point Load Position - Critical

Distance of M along member =3' 10" ft, in

Required flexural strength, M_x =118.0 kip ft

Design flexural strength =137.6 kip ft

Ratio =0.858



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x24 A992-50 - Critical

3' 10" Max UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =1' 2 9/64" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 13

Number of shear connectors to critical point, N_a 4

Degree of shear connection =0.243

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection



Warning

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x24 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} =432.9 in⁴Long term inertia, I_{al} =432.9 in⁴Short term inertia @ partial interaction, I_{as} =294.3 in⁴Long term inertia @ partial interaction, I_{al} =294.3 in⁴

Position Total load deflection =5' 9 7/8" ft, in

Deflection with full shear connection n, δ =0.506 in

Deflection of steel beam alone, δ_s =0.959 in

Minimum degree of shear connection =36.50 %

Deflection with partial shear connection, δ =0.556 in

Span over limit =0.575 in

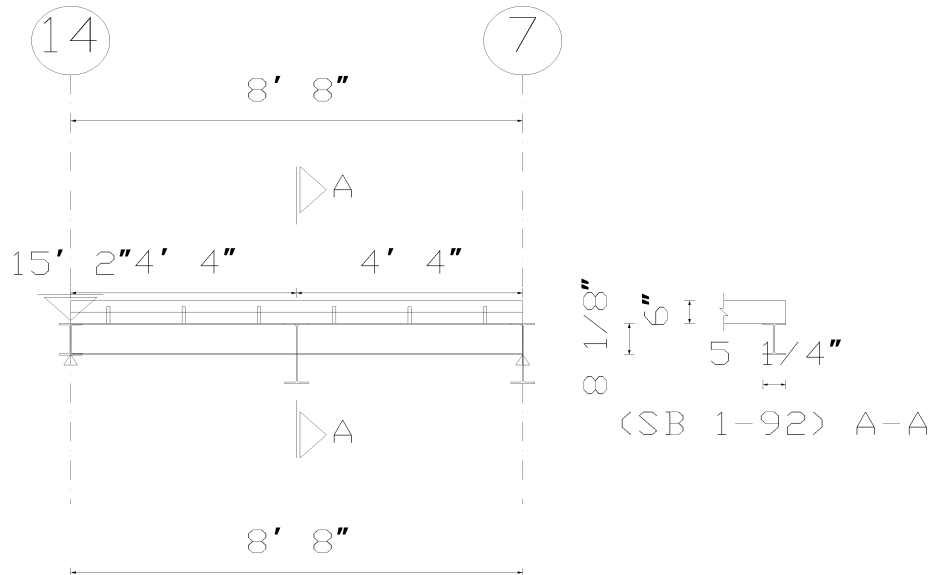
Design limit =0.575 in

Utilization Ratio =0.968



Pass

SB 1-92



Second Level: SB 1-92 = 1
W 8x18 A992-50 (6) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 4"		1.000		1.000		1.000		1.000
member	4' 4"	•						•	
sub-beam	4' 4"		1.000		1.000		1.000		1.000
support	8' 8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing distance [ft, in]
0"	8' 8"	6	1	1' 5 21/64"

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 1' 1 1/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (6 (6))

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.205	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	7.6	56.2	kip	0.136	✓ Pass
Flexure	2	32.9	102.4	kip ft	0.321	✓ Pass
Connector Resistance	2	3	6 (6)	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.006	-	in	-	-
Deflection Slab	2	0.048	0.433	in	0.111	✓ Pass
Deflection Dead	2	0.007	0.289	in	0.023	✓ Pass
Deflection Live	2	0.034	0.289	in	0.116	✓ Pass
Deflection Post Composite	2	0.040	0.289	in	0.140	✓ Pass
Deflection Total	2	0.095	0.433	in	0.218	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-3.1	56.2	kip	0.054	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	13.1	63.7	kip ft	0.205	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.006	-	in	-	-
Deflection Total	1	0.072	0.433	in	0.166	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 4' 4" - Critical

Moment, M_x =13.1 kip ft

Elastic modulus of steel, E =29000 ksi

Minimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 8' 8" - Critical

Position of V_{ry} =8' 8" ft, in

Required major axis shear strength, V_{ry} =-3.1 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.054



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical



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Yielding: 4' 4" - Critical

Dist of M_{rx} along member = 4' 4" ft, inRequired flexural strength, M_{rx1} = 13.1 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.205



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 4' 4" ft, in

Max. Total load deflection = 0.072 in

Span over limit = 0.433 in

Design limit = 0.433 in

Utilization Ratio = 0.166



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 4' 4" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w = 29.900 h / t_w limit for plastic stress distribution = 90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 7.6 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.136



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

4' 4" Max Moment Position - Critical

Distance of M along member = 4' 4" ft, in

Required flexural strength, M_x = 32.9 kip ft

Design flexural strength = 102.4 kip ft

Ratio = 0.321



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

4' 4" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 1' 5 21/64" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 6

Number of shear connectors to critical point, N_a 3

Degree of shear connection = **0.322**
Absolute minimum degree of shear connection = **0.250**
Optimum amount of shear connection = **0.500**
Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

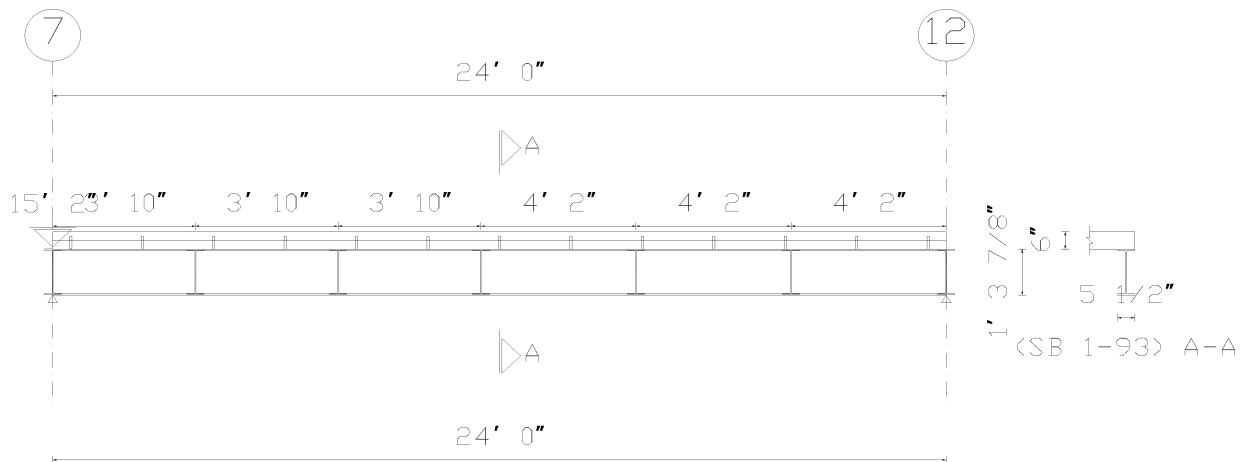
Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 263.9 in⁴
Long term inertia, I_{aL} = 263.9 in⁴
Short term inertia @ partial interaction, I_{as} = 176.5 in⁴
Long term inertia @ partial interaction, I_{aL} = 176.5 in⁴
Position Total load deflection = 4' 4" ft, in
Deflection with full shear connection n, δ = 0.084 in
Deflection of steel beam alone, δ_s = 0.153 in
Minimum degree of shear connection = 32.17 %
Deflection with partial shear connection, δ = 0.095 in
Span over limit = 0.433 in
Design limit = 0.433 in
Utilization Ratio = **0.218**

✓ Pass

SB 1-93



Second Level: SB 1-93 - 1

W 16x31 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	3' 10"		1.000		1.000		1.000		1.000
member	3' 10"	•						•	
sub-beam	3' 10"		1.000		1.000		1.000		1.000
member	7' 8"	•						•	
sub-beam	3' 10"		1.000		1.000		1.000		1.000
member	11' 6"	•						•	

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
sub-beam	4' 2"		1.000		1.000		1.000		1.000
member	15' 8"	•						•	
sub-beam	4' 2"		1.000		1.000		1.000		1.000
member	19' 10"	•						•	
sub-beam	4' 2"		1.000		1.000		1.000		1.000
support	24' 0"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing distance [ft, in]
0"	24' 0"	13	1	1' 11 1/32"

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 3' 0" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 16x31 (13 (13))

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.676	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	33.5	131.2	kip	0.255	✓ Pass
Flexure	2	237.8	310.4	kip ft	0.766	✓ Pass
Connector Resistance	2	6	13 (13)	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.082	-	in	-	-
Deflection Slab	2	0.533	1.200	in	0.444	✓ Pass
Deflection Dead	2	0.083	0.800	in	0.104	✓ Pass
Deflection Live	2	0.375	0.800	in	0.469	✓ Pass
Deflection Post Composite	2	0.458	0.800	in	0.573	✓ Pass
Deflection Total	2	1.073	1.200	in	0.894	✓ Pass

Construction Stage

W 16x31(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	14.3	131.2	kip	0.109	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	101.6	202.5	kip ft	0.502	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.082	-	in	-	-
Deflection Total	1	0.812	1.200	in	0.676	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Flexural: Position 3' 10" - Critical

Moment, M_x = 54.7 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 14.3 kip

Design shear strength = 131.2 kip AISC 360 G2

Ratio = 0.109



Pass

Flexure Major

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Yielding: 11' 6" - Critical

Dist of M_{rx} along member = 11' 6" ft, in

Required flexural strength, M_{rx1} = 101.6 kip ft

Design flexural strength = 202.5 kip ft AISC 360 F1, F2 and F3

Ratio = 0.502



Pass

Deflection

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 11' 11 3/8" ft, in

Max. Total load deflection = 0.812 in

Span over limit = 1.200 in

Design limit = 1.200 in

Utilization Ratio = 0.676



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

Position 11' 6" - Critical



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Web class Compact AISC 360 Table B4.1b
h / t_w =51.600
h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =33.5 kip

Design shear strength =131.2 kip AISC 360 G2

Ratio =0.255



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

11' 6" Max Moment Position - Critical

Distance of M along member =11' 6" ft, in

Required flexural strength, M_x =237.8 kip ft

Design flexural strength =310.4 kip ft

Ratio =0.766



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

11' 6" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =1' 11 1/32" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 13

Number of shear connectors to critical point, N_a 6

Degree of shear connection =0.283

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} =1272.8 in⁴Long term inertia, I_{al} =1272.8 in⁴Short term inertia @ partial interaction, I_{as} =852.7 in⁴Long term inertia @ partial interaction, I_{al} =852.7 in⁴

Position Total load deflection =11' 10 7/8" ft, in

Deflection with full shear connection n, δ =0.930 in

Deflection of steel beam alone, δ_s =1.624 in

Minimum degree of shear connection =28.31 %

Deflection with partial shear connection, δ =1.073 in

Span over limit =1.200 in

Design limit =1.200 in

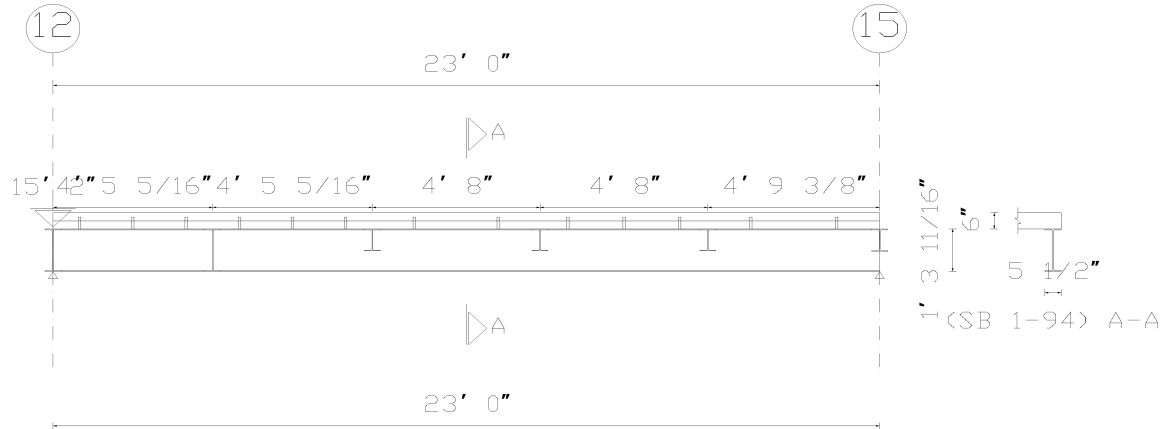
Utilization Ratio

=0.894



Pass

SB 1-94



Second Level: SB 1-94 = 1

W 16x26 A992-50 (3, 3, 2, 3, 2) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 5 3/8"		1.000		1.000		1.000		1.000
member	4' 5 3/8"	•						•	
sub-beam	4' 5 3/8"		1.000		1.000		1.000		1.000
member	8' 10 5/8"	•						•	
sub-beam	4' 8"		1.000		1.000		1.000		1.000
member	13' 6 5/8"	•						•	
sub-beam	4' 8"		1.000		1.000		1.000		1.000
member	18' 2 5/8"	•						•	
sub-beam	4' 9 3/8"		1.000		1.000		1.000		1.000
support	23' 0"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength

AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing distance [ft, in]
0"	8' 10 5/8"	6	1	1' 5 49/64"
8' 10 5/8"	13' 6 5/8"	2	1	2' 4"
13' 6 5/8"	18' 2 5/8"	3	1	1' 6 43/64"
18' 2 5/8"	23' 0"	2	1	2' 4 11/16"

Decking

Manufacturer Name Gauge Yield strength

VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'

6" ft, in 2' 10 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement

Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi

Reinforcement for crack control or fire requirements

Type Area Yield strength
6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 16x26 (3, 3, 2, 3, 2 (13))

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.554	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	27.0	106.0	kip	0.255	✓ Pass
Flexure	2	169.4	256.6	kip ft	0.660	✓ Pass
Connector Resistance	2	6	3, 3, 2, 3, 2 (13)	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.051	-	in	-	-
Deflection Slab	2	0.427	1.150	in	0.371	✓ Pass
Deflection Dead	2	0.061	0.767	in	0.080	✓ Pass
Deflection Live	2	0.305	0.767	in	0.398	✓ Pass
Deflection Post Composite	2	0.366	0.767	in	0.478	✓ Pass
Deflection Total	2	0.845	1.150	in	0.734	✓ Pass

Construction Stage

W 16x26(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	10.8	106.0	kip	0.101	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	67.3	159.5	kip ft	0.422	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.051	-	in	-	-
Deflection Total	1	0.637	1.150	in	0.554	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 4' 5 3/8" - Critical

Moment, M_x =47.5 kip ft

Elastic modulus of steel, E =29000 ksi

Minimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in



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Required major axis shear strength, V_{ry} =10.8 kip

Design shear strength =106.0 kip AISC 360 G2

Ratio =0.101



Pass

Flexure Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

LTB Flange Top: 8' 10 5/8" - 13' 6 5/8" - Critical

Dist of M_{rx1} along member =8' 10 5/8" ft, inRequired flexural strength, M_{rx1} =67.3 kip ft

Design flexural strength =159.5 kip ft AISC 360 F1, F2, F3 and F4

Ratio =0.422



Pass

Deflection

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =11' 4 3/4" ft, in

Max. Total load deflection =0.637 in

Span over limit =1.150 in

Design limit =1.150 in

Utilization Ratio =0.554



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 8' 10 5/8" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w =56.800 h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =27.0 kip

Design shear strength =106.0 kip AISC 360 G2

Ratio =0.255



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

13' 6 5/8" Point Load Position - Critical

Distance of M along member =13' 6 5/8" ft, in

Required flexural strength, M_x =169.4 kip ft

Design flexural strength =256.6 kip ft

Ratio =0.660



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

8' 10 5/8" Max Moment Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 4 11/16" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 13

Number of shear connectors to critical point, N_a 6

Degree of shear connection = 0.337

Absolute minimum degree of shear connection = 0.250

Optimum amount of shear connection = 0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 1078.4 in⁴

Long term inertia, I_{aL} = 1078.4 in⁴

Short term inertia @ partial interaction, I_{as} = 752.0 in⁴

Long term inertia @ partial interaction, I_{aL} = 752.0 in⁴

Position Total load deflection = 11' 4 7/8" ft, in

Deflection with full shear connection n , δ = 0.740 in

Deflection of steel beam alone, δ_s = 1.362 in

Minimum degree of shear connection = 33.65 %

Deflection with partial shear connection, δ = 0.845 in

Span over limit = 1.150 in

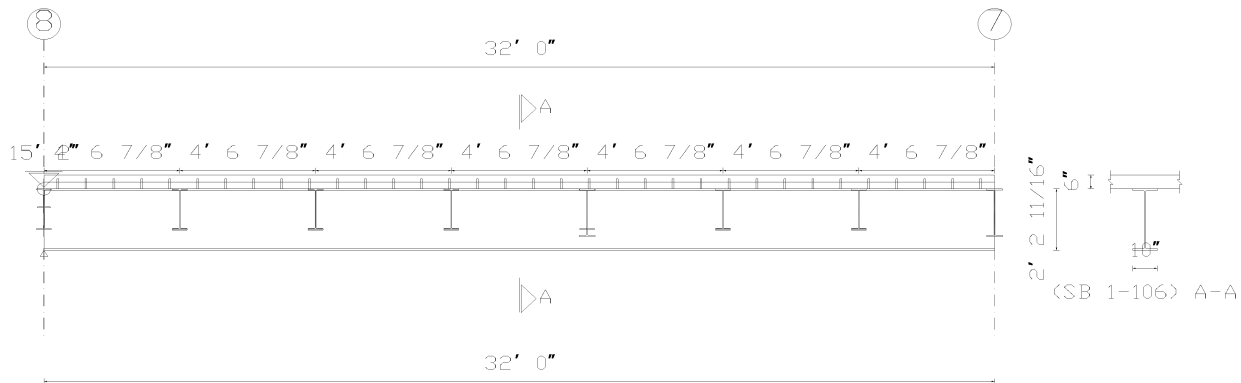
Design limit = 1.150 in

Utilization Ratio = 0.734



Pass

SB 1-106



Second Level: SB 1-106 = 1
W 27x84 A992-50 (34) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 6 7/8"		1.000		1.000		1.000		1.000

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
member	4' 6 7/8"	•						•	
sub-beam	4' 6 7/8"		1.000		1.000		1.000		1.000
member	9' 1 3/4"	•						•	
sub-beam	4' 6 7/8"		1.000		1.000		1.000		1.000
member	13' 8 5/8"	•						•	
sub-beam	4' 6 7/8"		1.000		1.000		1.000		1.000
member	18' 3 3/8"	•						•	
sub-beam	4' 6 7/8"		1.000		1.000		1.000		1.000
member	22' 10 1/4"	•						•	
sub-beam	4' 6 7/8"		1.000		1.000		1.000		1.000
member	27' 5 1/8"	•						•	
sub-beam	4' 6 7/8"		1.000		1.000		1.000		1.000
support	32' 0"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing distance [ft, in]
0"	32' 0"	34	1	11 19/64"

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 8' 1/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 27x84 (34 (34))

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.632	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-105.0	368.5	kip	0.285	✓ Pass
Flexure	2	957.8	1286.0	kip ft	0.745	✓ Pass
Connector Resistance	2	17	34 (34)	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.118	-	in	-	-
Deflection Slab	2	0.652	1.600	in	0.407	✓ Pass
Deflection Dead	2	0.118	1.067	in	0.111	✓ Pass
Deflection Live	2	0.341	1.067	in	0.320	✓ Pass
Deflection Post Composite	2	0.460	1.067	in	0.431	✓ Pass
Deflection Total	2	1.230	1.600	in	0.768	✓ Pass

Construction Stage

W 27x84(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-57.3	368.5	kip	0.155	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	521.5	915.0	kip ft	0.570	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.118	-	in	-	-
Deflection Total	1	1.011	1.600	in	0.632	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 27x84 A992-50 - Critical

Flexural: Position 4' 6 7/8" - Critical

Moment, M_x =260.6 kip ft

Elastic modulus of steel, E =29000 ksi

Minimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 27x84 A992-50 - Critical

Position 32' 0" - Critical

Position of V_{ry} =32' 0" ft, in

Required major axis shear strength, V_{ry} =-57.3 kip

Design shear strength =368.5 kip AISC 360 G2

Ratio =0.155

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 27x84 A992-50 - Critical

Yielding: 16' 1 3/8" - Critical

Dist of M_{rx} along member =16' 1 3/8" ft, in

Required flexural strength, M_{rx1} =521.5 kip ft

Design flexural strength =915.0 kip ft AISC 360 F1, F2 and F3

Ratio =0.570

✓ Pass

Deflection

1 Construction Stage

Span 1 W 27x84 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =16' 0" ft, in

Max. Total load deflection =1.011 in

Span over limit =1.600 in

Design limit =1.600 in



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Utilization Ratio **=0.632**

Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 27x84 A992-50 - Critical

Position 16' 1 1/2" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w **=52.700**h / t_w limit for plastic stress distribution **=90.553**

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 27x84 A992-50 - Critical

Position 32' 0" - Critical

Position of V_{ry} =32' 0" ft, inRequired major axis shear strength, V_{ry} =-105.0 kip

Design shear strength =368.5 kip AISC 360 G2

Ratio **=0.285**

Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 27x84 A992-50 - Critical

18' 3 3/8" Point Load Position - Critical

Distance of M along member =18' 3 3/8" ft, in

Required flexural strength, M_x =957.8 kip ft

Design flexural strength =1286.0 kip ft

Ratio **=0.745**

Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 27x84 A992-50 - Critical

16' 1 1/2" Max Moment Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =11 19/64" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 34

Number of shear connectors to critical point, N_a 17Degree of shear connection **=0.296**Absolute minimum degree of shear connection **=0.250**Optimum amount of shear connection **=0.500**

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 27x84 A992-50 - Critical

Deflection Total - Critical

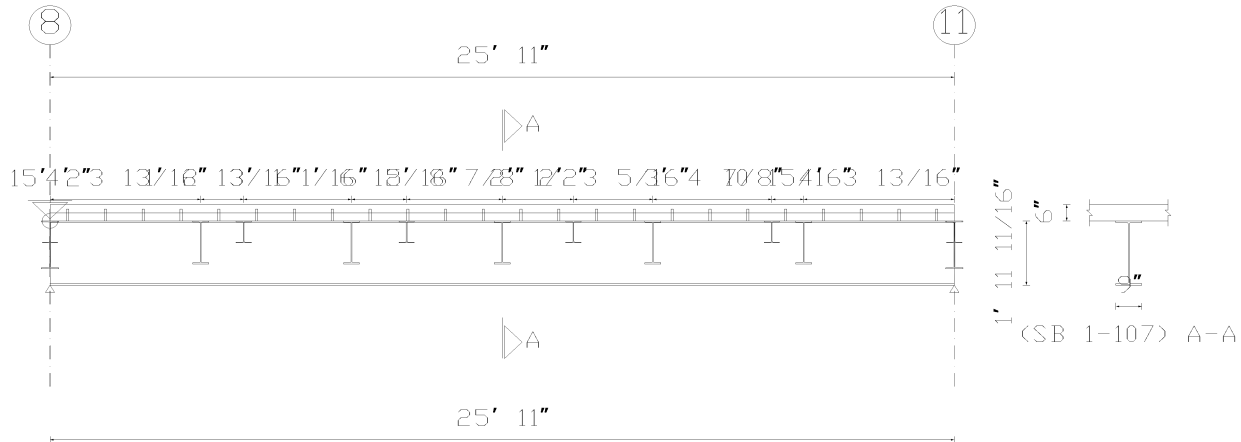
Short term inertia, I_{as} =7902.5 in⁴Long term inertia, I_{al} =7902.5 in⁴Short term inertia @ partial interaction, I_{as} =5601.0 in⁴Long term inertia @ partial interaction, I_{al} =5601.0 in⁴

Position Total load deflection =16' 0" ft, in

Deflection with full shear connection n, δ =1.105 in
Deflection of steel beam alone, δ_s =1.642 in
Minimum degree of shear connection =29.65 %
Deflection with partial shear connection, δ =1.230 in
Span over limit =1.600 in
Design limit =1.600 in
Utilization Ratio =**0.768**

✓ Pass

SB 1-107



Second Level: SB 1-107 = 1
W 24x68 A992-50 (24) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 3 7/8"		1.000		1.000		1.000		1.000
member	4' 3 7/8"	•						•	
sub-beam	1' 2 3/4"		1.000		1.000		1.000		1.000
member	5' 6 5/8"	•						•	
sub-beam	3' 1"		1.000		1.000		1.000		1.000
member	8' 7 5/8"	•						•	
sub-beam	1' 7"		1.000		1.000		1.000		1.000
member	10' 2 5/8"	•						•	
sub-beam	2' 8 7/8"		1.000		1.000		1.000		1.000
member	12' 11 1/2"	•						•	
sub-beam	2' 1/2"		1.000		1.000		1.000		1.000
member	15' 0"	•						•	
sub-beam	2' 3 3/8"		1.000		1.000		1.000		1.000
member	17' 3 3/8"	•						•	
sub-beam	3' 4 7/8"		1.000		1.000		1.000		1.000
member	20' 8 1/4"	•						•	
sub-beam	11"		1.000		1.000		1.000		1.000
member	21' 7 1/8"	•						•	
sub-beam	4' 3 7/8"		1.000		1.000		1.000		1.000
support	25' 11"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing distance [ft, in]
0"	25' 11"	24	1	1' 63/64"

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 6' 5 3/4" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 24x68 (24 (24))

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.346	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-60.1	295.1	kip	0.204	✓ Pass
Flexure	2	442.5	883.6	kip ft	0.501	✓ Pass
Connector Resistance	2	9	24 (24)	-	-	⚠ Warning
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.045	-	in	-	-
Deflection Slab	2	0.295	1.296	in	0.228	✓ Pass
Deflection Dead	2	0.054	0.864	in	0.063	✓ Pass
Deflection Live	2	0.191	0.864	in	0.221	✓ Pass
Deflection Post Composite	2	0.245	0.864	in	0.284	✓ Pass
Deflection Total	2	0.585	1.296	in	0.451	✓ Pass

Construction Stage

W 24x68(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-29.5	295.1	kip	0.100	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	228.9	663.7	kip ft	0.345	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.045	-	in	-	-
Deflection Total	1	0.449	1.296	in	0.346	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification



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1 Construction Stage

Span 1 W 24x68 A992-50 - Critical

Flexural: Position 4' 3 7/8" - Critical

Moment, M_x =126.3 kip ftElastic modulus of steel, E =29000 ksiMinimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 24x68 A992-50 - Critical

Position 25' 11" - Critical

Position of V_{ry} =25' 11" ft, inRequired major axis shear strength, V_{ry} =-29.5 kip

Design shear strength =295.1 kip AISC 360 G2

Ratio =0.100



Pass

Flexure Major

1 Construction Stage

Span 1 W 24x68 A992-50 - Critical

Yielding: 12' 11 1/2" - Critical

Dist of M_{rx} along member =12' 11 1/2" ft, inRequired flexural strength, M_{rx1} =228.9 kip ft

Design flexural strength =663.7 kip ft AISC 360 F1, F2 and F3

Ratio =0.345



Pass

Deflection

1 Construction Stage

Span 1 W 24x68 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =12' 11 1/2" ft, in

Max. Total load deflection =0.449 in

Span over limit =1.296 in

Design limit =1.296 in

Utilization Ratio =0.346



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 24x68 A992-50 - Critical

Position 12' 11 1/2" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w =52.000 h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 24x68 A992-50 - Critical

Position 25' 11" - Critical

Position of V_{ry} =25' 11" ft, inRequired major axis shear strength, V_{ry} =-60.1 kip

Design shear strength =295.1 kip AISC 360 G2



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Ratio **=0.204**

Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 24x68 A992-50 - Critical

10' 2 5/8" Point Load Position - Critical

Distance of M along member =10' 2 5/8" ft, in

Required flexural strength, M_x =442.5 kip ft

Design flexural strength =883.6 kip ft

Ratio **=0.501**

Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 24x68 A992-50 - Critical

10' 2 5/8" Max UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =1' 63/64" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 24

Number of shear connectors to critical point, N_a 9Degree of shear connection **=0.193**Absolute minimum degree of shear connection **=0.250**Optimum amount of shear connection **=0.500**

Partial shear connection

Warning

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 24x68 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} =5257.1 in⁴Long term inertia, I_{al} =5257.1 in⁴Short term inertia @ partial interaction, I_{as} =3567.9 in⁴Long term inertia @ partial interaction, I_{al} =3567.9 in⁴

Position Total load deflection =12' 11 1/2" ft, in

Deflection with full shear connection n , δ =0.513 inDeflection of steel beam alone, δ_s =0.798 in

Minimum degree of shear connection =25.72 %

Deflection with partial shear connection, δ =0.585 in

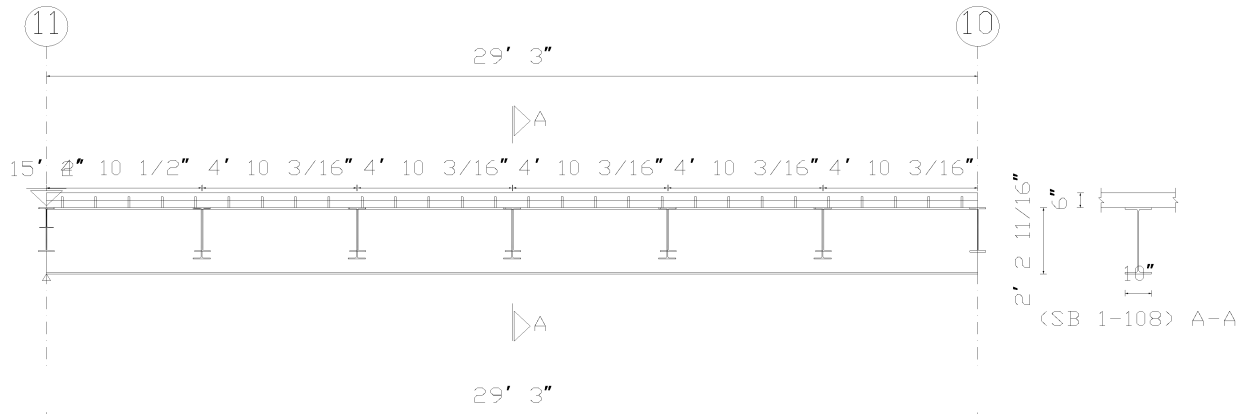
Span over limit =1.296 in

Design limit =1.296 in

Utilization Ratio **=0.451**

Pass

SB 1-108



Second Level: SB 1-108 = 1
W 27x84 A992-50 (28) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 10 1/2"		1.000		1.000		1.000		1.000
member	4' 10 1/2"	•						•	
sub-beam	1/4"		1.000		1.000		1.000		1.000
member	4' 10 3/4"	•						•	
sub-beam	4' 10 1/4"		1.000		1.000		1.000		1.000
member	9' 9"	•						•	
sub-beam	1/4"		1.000		1.000		1.000		1.000
member	9' 9 1/4"	•						•	
sub-beam	4' 10 1/4"		1.000		1.000		1.000		1.000
member	14' 7 1/2"	•						•	
sub-beam	1/4"		1.000		1.000		1.000		1.000
member	14' 7 3/4"	•						•	
sub-beam	4' 10 1/4"		1.000		1.000		1.000		1.000
member	19' 6"	•						•	
sub-beam	1/4"		1.000		1.000		1.000		1.000
member	19' 6 1/4"	•						•	
sub-beam	4' 10 1/4"		1.000		1.000		1.000		1.000
member	24' 4 1/2"	•						•	
sub-beam	1/4"		1.000		1.000		1.000		1.000
member	24' 4 3/4"	•						•	
sub-beam	4' 10 1/4"		1.000		1.000		1.000		1.000
support	29' 3"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing distance [ft, in]
0"	29' 3"	28	1	1' 9/16"

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Manufacturer Name Gauge Yield strength
 VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
 6" ft, in 6' 1 3/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
 Type Area Yield strength Type Area Yield strength
 Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 27x84 (28 (28))

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.486	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-94.9	368.5	kip	0.258	✓ Pass
Flexure	2	829.5	1264.0	kip ft	0.656	✓ Pass
Connector Resistance	2	14	28 (28)	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.082	-	in	-	-
Deflection Slab	2	0.456	1.462	in	0.312	✓ Pass
Deflection Dead	2	0.089	0.975	in	0.091	✓ Pass
Deflection Live	2	0.265	0.975	in	0.272	✓ Pass
Deflection Post Composite	2	0.354	0.975	in	0.363	✓ Pass
Deflection Total	2	0.893	1.462	in	0.610	✓ Pass

Construction Stage

W 27x84(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-51.0	368.5	kip	0.138	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	444.2	915.0	kip ft	0.486	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.082	-	in	-	-
Deflection Total	1	0.708	1.462	in	0.484	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 27x84 A992-50 - Critical

Flexural: Position 4' 10 1/2" - Critical

Moment, M_x =246.7 kip ft

Elastic modulus of steel, E =29000 ksi

Minimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major



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1 Construction Stage

Span 1 W 27x84 A992-50 - Critical

Position 29' 3" - Critical

Position of V_{ry} = 29' 3" ft, inRequired major axis shear strength, V_{ry} = -51.0 kip

Design shear strength = 368.5 kip AISC 360 G2

Ratio = 0.138



Pass

Flexure Major

1 Construction Stage

Span 1 W 27x84 A992-50 - Critical

Yielding: 14' 7 1/2" - Critical

Dist of M_{rx} along member = 14' 7 1/2" ft, inRequired flexural strength, M_{rx1} = 444.2 kip ft

Design flexural strength = 915.0 kip ft AISC 360 F1, F2 and F3

Ratio = 0.486



Pass

Deflection

1 Construction Stage

Span 1 W 27x84 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 14' 7 1/2" ft, in

Max. Total load deflection = 0.708 in

Span over limit = 1.462 in

Design limit = 1.462 in

Utilization Ratio = 0.484



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 27x84 A992-50 - Critical

Position 14' 7 1/2" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w = 52.700 h / t_w limit for plastic stress distribution = 90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 27x84 A992-50 - Critical

Position 29' 3" - Critical

Position of V_{ry} = 29' 3" ft, inRequired major axis shear strength, V_{ry} = -94.9 kip

Design shear strength = 368.5 kip AISC 360 G2

Ratio = 0.258



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 27x84 A992-50 - Critical

14' 7 1/2" Max Moment Position - Critical

Distance of M along member = 14' 7 1/2" ft, in

Required flexural strength, M_x = 829.5 kip ft



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Design flexural strength =1264.0 kip ft

Ratio =0.656

✓ Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 27x84 A992-50 - Critical

14' 7 1/2" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =1' 9/16" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 28

Number of shear connectors to critical point, N_a 14

Degree of shear connection =0.269

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 27x84 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} =7445.1 in⁴Long term inertia, I_{al} =7445.1 in⁴Short term inertia @ partial interaction, I_{as} =5231.8 in⁴Long term inertia @ partial interaction, I_{al} =5231.8 in⁴

Position Total load deflection =14' 7 1/2" ft, in

Deflection with full shear connection n, δ =0.796 in

Deflection of steel beam alone, δ_s =1.164 in

Minimum degree of shear connection =26.87 %

Deflection with partial shear connection, δ =0.893 in

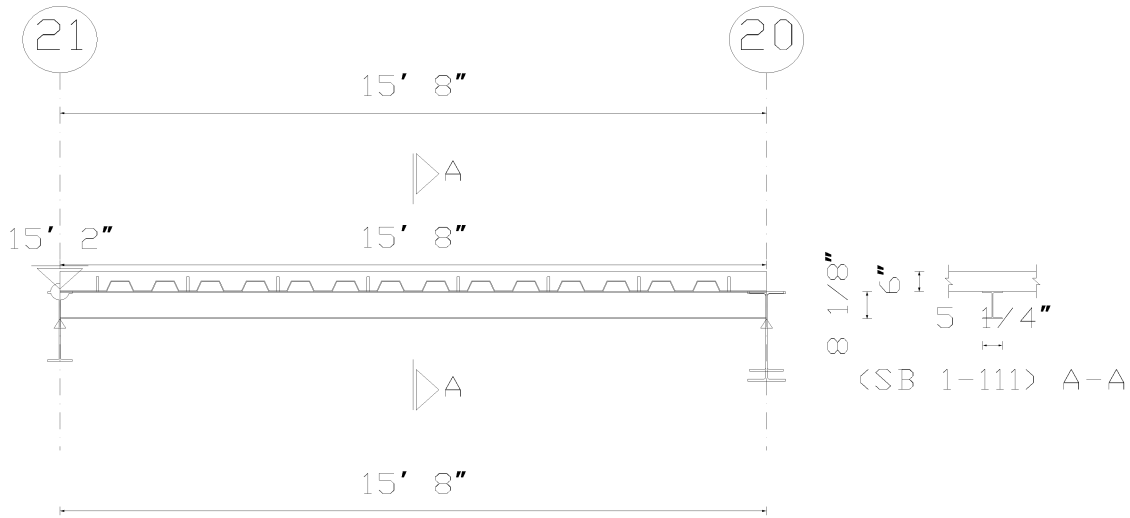
Span over limit =1.462 in

Design limit =1.462 in

Utilization Ratio =0.610

✓ Pass

SB 1-111



Second Level: SB 1-111 - 1
W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	15' 8"	•	1.000		1.000		1.000		1.000
support	15' 8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	15' 8"	8	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 3' 11" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.414	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-10.2	56.2	kip	0.182	✓ Pass
Flexure	2	40.0	107.1	kip ft	0.373	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Connector Resistance	2	4	8		-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.014	-	in	-	-
Deflection Slab	2	0.227	0.783	in	0.289	✓ Pass
Deflection Dead	2	0.023	0.522	in	0.044	✓ Pass
Deflection Live	2	0.115	0.522	in	0.220	✓ Pass
Deflection Post Composite	2	0.138	0.522	in	0.264	✓ Pass
Deflection Total	2	0.378	0.783	in	0.483	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.9	56.2	kip	0.070	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	15.5	63.7	kip ft	0.242	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.014	-	in	-	-
Deflection Total	1	0.324	0.783	in	0.414	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 7' 10" - Critical

Moment, M_x = 15.5 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 3.9 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.070

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 10" - Critical

Dist of M_{rx} along member = 7' 10" ft, in

Required flexural strength, M_{rx1} = 15.5 kip ft



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Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3
Ratio =0.242



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =7' 10" ft, in

Max. Total load deflection =0.324 in

Span over limit =0.783 in

Design limit =0.783 in

Utilization Ratio =0.414



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 10" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w =29.900h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 15' 8" - Critical

Position of V_{ry} =15' 8" ft, inRequired major axis shear strength, V_{ry} =-10.2 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.182



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 10" Max Moment Position - Critical

Distance of M along member =7' 10" ft, in

Required flexural strength, M_x =40.0 kip ft

Design flexural strength =107.1 kip ft

Ratio =0.373



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 10" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4

Degree of shear connection =0.262

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 376.5 in⁴

Long term inertia, I_{aL} = 376.5 in⁴

Short term inertia @ partial interaction, I_{as} = 222.9 in⁴

Long term inertia @ partial interaction, I_{aL} = 222.9 in⁴

Position Total load deflection = 7' 10" ft, in

Deflection with full shear connection n , δ = 0.326 in

Deflection of steel beam alone, δ_s = 0.709 in

Minimum degree of shear connection = 26.20 %

Deflection with partial shear connection, δ = 0.378 in

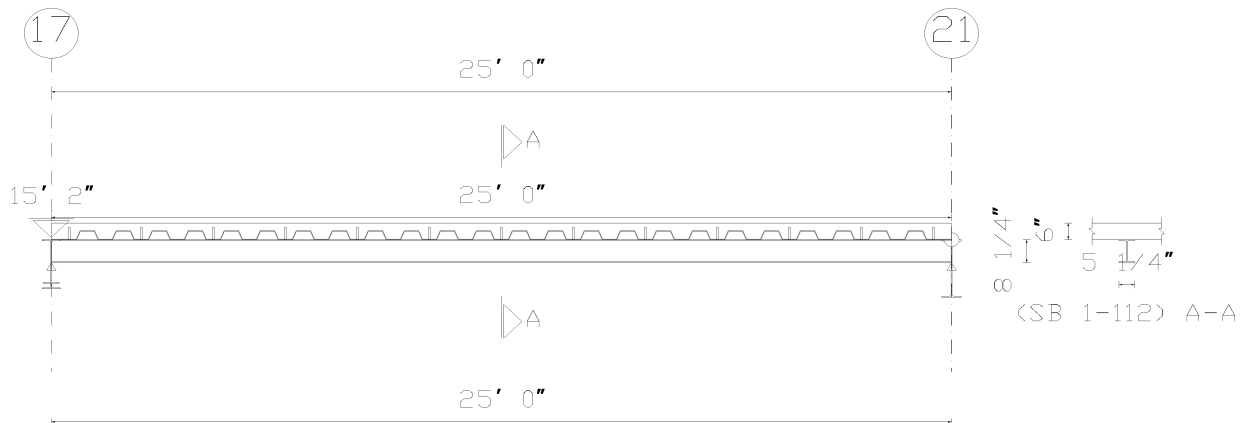
Span over limit = 0.783 in

Design limit = 0.783 in

Utilization Ratio = **0.483**

✓ Pass

SB 1-112



Second Level: SB 1-112 = 1
W 8x21 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	25' 0"	•	1.000		1.000		1.000		1.000
support	25' 0"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength

AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	25' 0"	13	1	2

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Manufacturer Name Gauge Yield strength
 VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
 6" ft, in 5' 3/4" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
 Type Area Yield strength Type Area Yield strength
 Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x21 (13) C= 0.75

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.775	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	16.3	62.1	kip	0.263	✓ Pass
Flexure	2	102.1	137.3	kip ft	0.744	✓ Pass
Connector Resistance	2	6	13	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Slab	2	0.527	1.250	in	0.422	✓ Pass
Deflection Dead	2	0.107	0.833	in	0.129	✓ Pass
Deflection Live	2	0.535	0.833	in	0.643	✓ Pass
Deflection Post Composite	2	0.643	0.833	in	0.771	✓ Pass
Deflection Total	2	1.170	1.250	in	0.936	✓ Pass

Construction Stage

W 8x21(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	6.3	62.1	kip	0.102	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	39.6	76.5	kip ft	0.518	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Total	1	0.969	1.250	in	0.775	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x21 A992-50 - Critical

Flexural: Position 12' 6" - Critical

Moment, M_x = 39.6 kip ftElastic modulus of steel, E = 29000 ksiMinimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage



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Span 1 W 8x21 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 6.3 kip

Design shear strength = 62.1 kip AISC 360 G2

Ratio = 0.102



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x21 A992-50 - Critical

Yielding: 12' 6" - Critical

Dist of M_{rx} along member = 12' 6" ft, inRequired flexural strength, M_{rx1} = 39.6 kip ft

Design flexural strength = 76.5 kip ft AISC 360 F1, F2 and F3

Ratio = 0.518



Pass

Deflection

1 Construction Stage

Span 1 W 8x21 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 12' 6" ft, in

Max. Total load deflection = 1.719 in

Cambered Total load deflection = 0.969 in

Span over limit = 1.250 in

Design limit = 1.250 in

Utilization Ratio = 0.775



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

Position 12' 6" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w = 27.500 h / t_w limit for plastic stress distribution = 90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 16.3 kip

Design shear strength = 62.1 kip AISC 360 G2

Ratio = 0.263



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

12' 6" Max Moment Position - Critical

Distance of M along member = 12' 6" ft, in

Required flexural strength, M_x = 102.1 kip ft



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Design flexural strength =137.3 kip ft

Ratio =0.744



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

12' 6" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 13

Number of shear connectors to critical point, N_a 6

Degree of shear connection =0.336

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} =458.8 in⁴Long term inertia, I_{al} =458.8 in⁴Short term inertia @ partial interaction, I_{as} =297.5 in⁴Long term inertia @ partial interaction, I_{al} =297.5 in⁴

Position Total load deflection =12' 6" ft, in

Deflection with full shear connection n, δ =0.953 in

Deflection of steel beam alone, δ_s =3.743 in

Minimum degree of shear connection =33.56 %

Deflection with partial shear connection, δ =1.920 in

Cambered Total load deflection =1.170 in

Span over limit =1.250 in

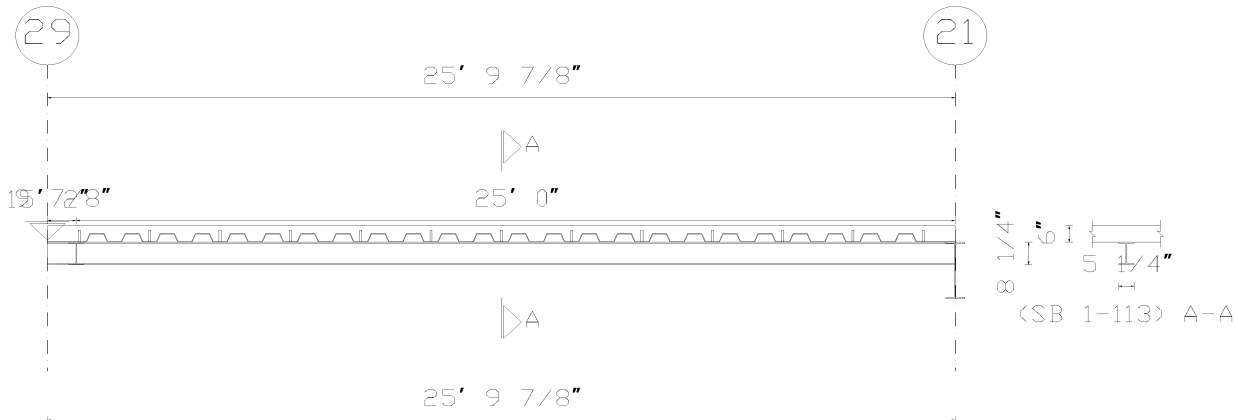
Design limit =1.250 in

Utilization Ratio =0.936



Pass

SB 1-113



Second Level: SB 1-113 = 1
W 8x21 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	9 7/8"	•	1.000		1.000		1.000		1.000
member	9 7/8"	•						•	
sub-beam	25' 0"	•	1.000		1.000		1.000		1.000
support	25' 9 7/8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	25' 9 7/8"	13	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 2' 9 3/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x21 (13) C= 0.50

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.476	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	9.8	62.1	kip	0.158	✓ Pass
Flexure	2	60.6	135.7	kip ft	0.447	✓ Pass
Connector Resistance	2	6	13	-	-	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Slab	2	0.339	1.291	in	0.263	✓ Pass
Deflection Dead	2	0.075	0.861	in	0.087	✓ Pass
Deflection Live	2	0.376	0.861	in	0.437	✓ Pass
Deflection Post Composite	2	0.451	0.861	in	0.524	✓ Pass
Deflection Total	2	0.790	1.291	in	0.612	✓ Pass

Construction Stage

W 8x21(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.9	62.1	kip	0.063	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	24.1	76.5	kip ft	0.315	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Total	1	0.614	1.291	in	0.476	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x21 A992-50 - Critical

Flexural: Position 9 7/8" - Critical

Moment, M_x = 3.1 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x21 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 3.9 kip

Design shear strength = 62.1 kip AISC 360 G2

Ratio = 0.063

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 8x21 A992-50 - Critical

Yielding: 12' 11 1/8" - Critical

Dist of M_{rx} along member = 12' 11 1/8" ft, in

Required flexural strength, M_{rx} = 24.1 kip ft

Design flexural strength = 76.5 kip ft AISC 360 F1, F2 and F3

Ratio = 0.315

✓ Pass



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Deflection

1 Construction Stage

Span 1 W 8x21 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =12' 11" ft, in
Max. Total load deflection =1.114 in
Cambered Total load deflection =0.614 in
Span over limit =1.291 in
Design limit =1.291 in
Utilization Ratio =0.476



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

Position 12' 11 1/8" - Critical

Web class Compact AISC 360 Table B4.1b
h / t_w =27.500
h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in
Required major axis shear strength, V_{ry} =9.8 kip
Design shear strength =62.1 kip AISC 360 G2
Ratio =0.158



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

12' 11 1/8" Max Moment Position - Critical

Distance of M along member =12' 11 1/8" ft, in
Required flexural strength, M_x =60.6 kip ft
Design flexural strength =135.7 kip ft
Ratio =0.447



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

12' 11 1/8" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in
Maximum permitted group spacing =3' 0" ft, in
Number of shear connectors over full beam length 13
Number of shear connectors to critical point, N_a 6
Degree of shear connection =0.336
Absolute minimum degree of shear connection =0.250
Optimum amount of shear connection =0.500
Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

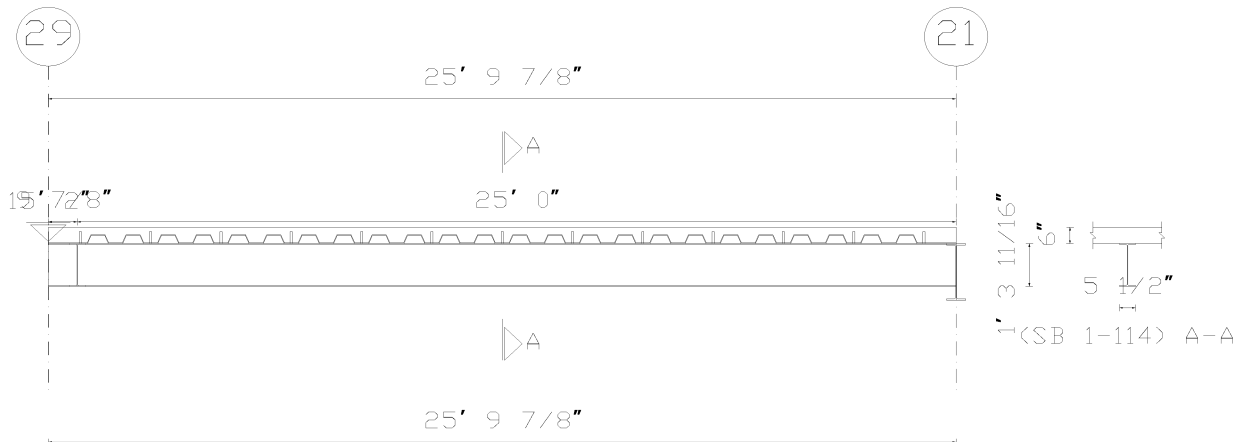
Span 1 W 8x21 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as}	=398.1 in ⁴
Long term inertia, I_{al}	=398.1 in ⁴
Short term inertia @ partial interaction, I_{as}	=262.3 in ⁴
Long term inertia @ partial interaction, I_{al}	=262.3 in ⁴
Position Total load deflection	=12' 11" ft, in
Deflection with full shear connection n , δ	=0.641 in
Deflection of steel beam alone, δ_s	=2.374 in
Minimum degree of shear connection	=33.56 %
Deflection with partial shear connection, δ	=1.290 in
Cambered Total load deflection	=0.790 in
Span over limit	=1.291 in
Design limit	=1.291 in
Utilization Ratio	=0.612

Pass

SB 1-114



Second Level: SB 1-114 = 1
W 16x26 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	9 7/8"	•	1.000		1.000		1.000		1.000
member	9 7/8"	•						•	
sub-beam	25' 0"	•	1.000		1.000		1.000		1.000
support	25' 9 7/8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	25' 9 7/8"	13	1	2



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Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 8 3/4" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 16x26 (13)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.406	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	38.4	106.0	kip	0.362	✓ Pass
Flexure	2	111.0	255.2	kip ft	0.435	✓ Pass
Connector Resistance	2	6	13	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.036	-	in	-	-
Deflection Slab	2	0.357	1.291	in	0.276	✓ Pass
Deflection Dead	2	0.050	0.861	in	0.058	✓ Pass
Deflection Live	2	0.244	0.861	in	0.284	✓ Pass
Deflection Post Composite	2	0.294	0.861	in	0.342	✓ Pass
Deflection Total	2	0.687	1.291	in	0.532	✓ Pass

Construction Stage

W 16x26(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	15.4	106.0	kip	0.146	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	44.2	165.7	kip ft	0.267	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.036	-	in	-	-
Deflection Total	1	0.524	1.291	in	0.406	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 9 7/8" - Critical

Moment, M_x =12.5 kip ftElastic modulus of steel, E =29000 ksiMinimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b



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Shear Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 15.4 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.146



Pass

Flexure Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Yielding: 12' 3 3/8" - Critical

Dist of M_{rx} along member = 12' 3 3/8" ft, inRequired flexural strength, M_{rx1} = 44.2 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.267



Pass

Deflection

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 12' 8 5/8" ft, in

Max. Total load deflection = 0.524 in

Cambered Total load deflection = 0.524 in

Span over limit = 1.291 in

Design limit = 1.291 in

Utilization Ratio = 0.406



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 12' 3 1/2" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w = 56.800 h / t_w limit for plastic stress distribution = 90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 38.4 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.362



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

12' 3 1/2" Max Moment Position - Critical



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Distance of M along member =12' 3 1/2" ft, in

Required flexural strength, M_x =111.0 kip ft

Design flexural strength =255.2 kip ft

Ratio =0.435



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

12' 3 1/2" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 13

Number of shear connectors to critical point, N_a 6

Degree of shear connection =0.269

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{aS} =1189.1 in⁴Long term inertia, I_{aL} =1189.1 in⁴Short term inertia @ partial interaction, I_{aS} =761.8 in⁴Long term inertia @ partial interaction, I_{aL} =761.8 in⁴

Position Total load deflection =12' 8 1/2" ft, in

Deflection with full shear connection n , δ =0.586 inDeflection of steel beam alone, δ_s =1.116 in

Minimum degree of shear connection =26.92 %

Deflection with partial shear connection, δ =0.687 in

Cambered Total load deflection =0.687 in

Span over limit =1.291 in

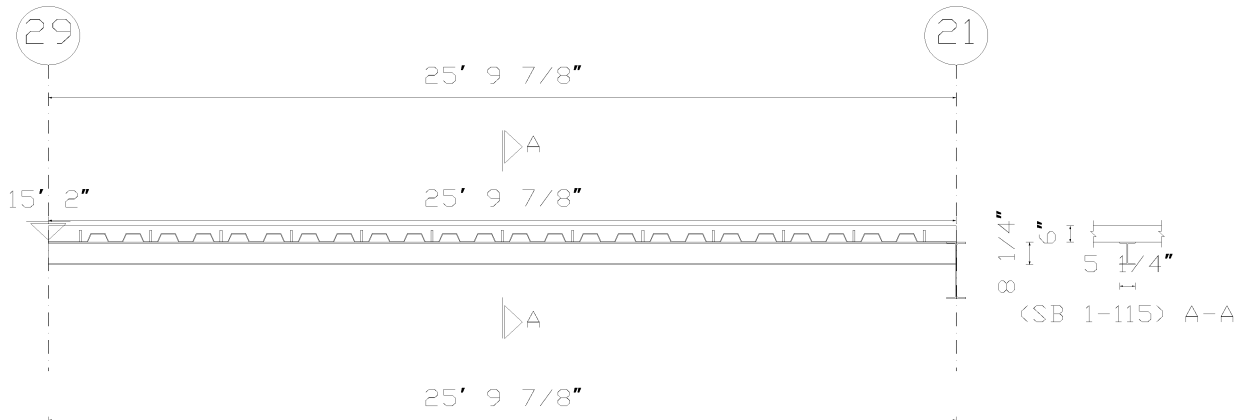
Design limit =1.291 in

Utilization Ratio =0.532



Pass

SB 1-115



Second Level: SB 1-115 = 1
W 8x21 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	25' 9 7/8"	•	1.000		1.000		1.000		1.000
support	25' 9 7/8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	25' 9 7/8"	13	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x21 (13) C= 1.00

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.630	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	15.6	62.1	kip	0.251	✓ Pass
Flexure	2	100.8	137.1	kip ft	0.735	✓ Pass
Connector Resistance	2	6	13	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Slab	2	0.349	1.291	in	0.270	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Dead	2	0.114	0.861	in	0.132	✓ Pass
Deflection Live	2	0.570	0.861	in	0.662	✓ Pass
Deflection Post Composite	2	0.684	0.861	in	0.794	✓ Pass
Deflection Total	2	1.033	1.291	in	0.800	✓ Pass

Construction Stage

W 8x21(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	6.1	62.1	kip	0.098	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	39.2	76.5	kip ft	0.513	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Total	1	0.813	1.291	in	0.630	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x21 A992-50 - Critical

Flexural: Position 12' 11" - Critical

Moment, M_x = 39.2 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x21 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 6.1 kip

Design shear strength = 62.1 kip AISC 360 G2

Ratio = 0.098



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x21 A992-50 - Critical

Yielding: 12' 11" - Critical

Dist of M_{rx} along member = 12' 11" ft, in

Required flexural strength, M_{rx1} = 39.2 kip ft

Design flexural strength = 76.5 kip ft AISC 360 F1, F2 and F3

Ratio = 0.513



Pass

Deflection

1 Construction Stage

Span 1 W 8x21 A992-50 - Critical



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Deflection Total - Critical

Position Total load deflection =12' 11" ft, in
Max. Total load deflection =1.813 in
Cambered Total load deflection =0.813 in
Span over limit =1.291 in
Design limit =1.291 in
Utilization Ratio =0.630



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

Position 12' 11" - Critical

Web class Compact AISC 360 Table B4.1b
h / t_w =27.500
h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in
Required major axis shear strength, V_{ry} =15.6 kip
Design shear strength =62.1 kip AISC 360 G2
Ratio =0.251



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

12' 11" Max Moment Position - Critical

Distance of M along member =12' 11" ft, in
Required flexural strength, M_x =100.8 kip ft
Design flexural strength =137.1 kip ft
Ratio =0.735



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

12' 11" Max Moment and UR Position - Critical

Layout and strength of shear connectors
Maximum group spacing, s =2' 0" ft, in
Maximum permitted group spacing =3' 0" ft, in
Number of shear connectors over full beam length 13
Number of shear connectors to critical point, N_a 6
Degree of shear connection =0.336
Absolute minimum degree of shear connection =0.250
Optimum amount of shear connection =0.500
Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

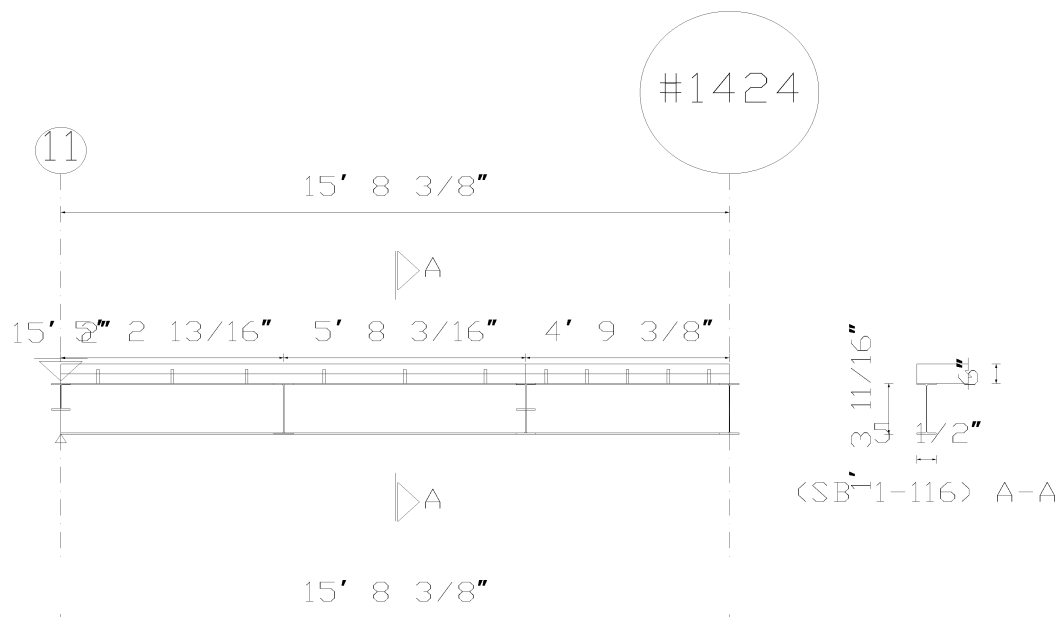
Span 1 W 8x21 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as}	=451.1 in ⁴
Long term inertia, I_{aL}	=451.1 in ⁴
Short term inertia @ partial interaction, I_{as}	=293.0 in ⁴
Long term inertia @ partial interaction, I_{aL}	=293.0 in ⁴
Position Total load deflection	=12' 11" ft, in
Deflection with full shear connection n , δ	=0.802 in
Deflection of steel beam alone, δ_s	=3.939 in
Minimum degree of shear connection	=33.56 %
Deflection with partial shear connection, δ	=2.033 in
Cambered Total load deflection	=1.033 in
Span over limit	=1.291 in
Design limit	=1.291 in
Utilization Ratio	=0.800

✓ Pass

SB 1-116



Second Level: SB 1-116 = 1
W 16x26 A992-50 (3, 3, 5) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	5' 2 3/4"		1.000		1.000		1.000		1.000
member	5' 2 3/4"	•						•	
sub-beam	5' 8 1/4"		1.000		1.000		1.000		1.000
member	10' 11"	•						•	
sub-beam	4' 9 3/8"		1.000		1.000		1.000		1.000
support	15' 8 3/8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength



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AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing distance [ft, in]
0"	5' 2 3/4"	3	1	1' 8 15/16"
5' 2 3/4"	10' 11"	3	1	1' 10 47/64"
10' 11"	15' 8 3/8"	5	1	11 15/32"

Decking

Manufacturer Name Gauge Yield strength
 VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
 6" ft, in 1' 11 5/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
 Type Area Yield strength Type Area Yield strength
 Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 16x26 (3, 3, 5 (11))

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.290	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-23.8	106.0	kip	0.225	✓ Pass
Flexure	2	103.1	224.8	kip ft	0.459	✓ Pass
Connector Resistance	2	3	3, 3, 5 (11)	-	-	⚠ Warning
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.017	-	in	-	-
Deflection Slab	2	0.133	0.785	in	0.169	✓ Pass
Deflection Dead	2	0.022	0.523	in	0.042	✓ Pass
Deflection Live	2	0.109	0.523	in	0.208	✓ Pass
Deflection Post Composite	2	0.130	0.523	in	0.249	✓ Pass
Deflection Total	2	0.280	0.785	in	0.357	✓ Pass

Construction Stage

W 16x26(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-9.5	106.0	kip	0.090	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	45.1	155.8	kip ft	0.290	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.017	-	in	-	-
Deflection Total	1	0.199	0.785	in	0.253	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage



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Classification

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 5' 2 3/4" - Critical

Moment, M_x =40.9 kip ftElastic modulus of steel, E =29000 ksiMinimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Position 15' 8 3/8" - Critical

Position of V_{ry} =15' 8 3/8" ft, inRequired major axis shear strength, V_{ry} =-9.5 kip

Design shear strength =106.0 kip AISC 360 G2

Ratio =0.090



Pass

Flexure Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

LTB Flange Top: 5' 2 3/4" - 10' 11" - Critical

Dist of M_{rx1} along member =10' 11" ft, inRequired flexural strength, M_{rx1} =45.1 kip ft

Design flexural strength =155.8 kip ft AISC 360 F1, F2, F3 and F4

Ratio =0.290



Pass

Deflection

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =8' 1/4" ft, in

Max. Total load deflection =0.199 in

Span over limit =0.785 in

Design limit =0.785 in

Utilization Ratio =0.253



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 10' 11" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w =56.800 h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 15' 8 3/8" - Critical

Position of V_{ry} =15' 8 3/8" ft, inRequired major axis shear strength, V_{ry} =-23.8 kip



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Design shear strength =106.0 kip AISC 360 G2
Ratio =0.225

✓ Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

5' 2 3/4" Point Load Position - Critical

Distance of M along member =5' 2 3/4" ft, in

Required flexural strength, M_x =103.1 kip ft

Design flexural strength =224.8 kip ft

Ratio =0.459

✓ Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

5' 2 3/4" Max UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =1' 10 47/64" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 11

Number of shear connectors to critical point, N_a 3

Degree of shear connection =0.179

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection

⚠ Warning

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{aS} =979.0 in⁴Long term inertia, I_{aL} =979.0 in⁴Short term inertia @ partial interaction, I_{aS} =671.1 in⁴Long term inertia @ partial interaction, I_{aL} =671.1 in⁴

Position Total load deflection =8' 5/8" ft, in

Deflection with full shear connection n , δ =0.243 inDeflection of steel beam alone, δ_s =0.424 in

Minimum degree of shear connection =29.79 %

Deflection with partial shear connection, δ =0.280 in

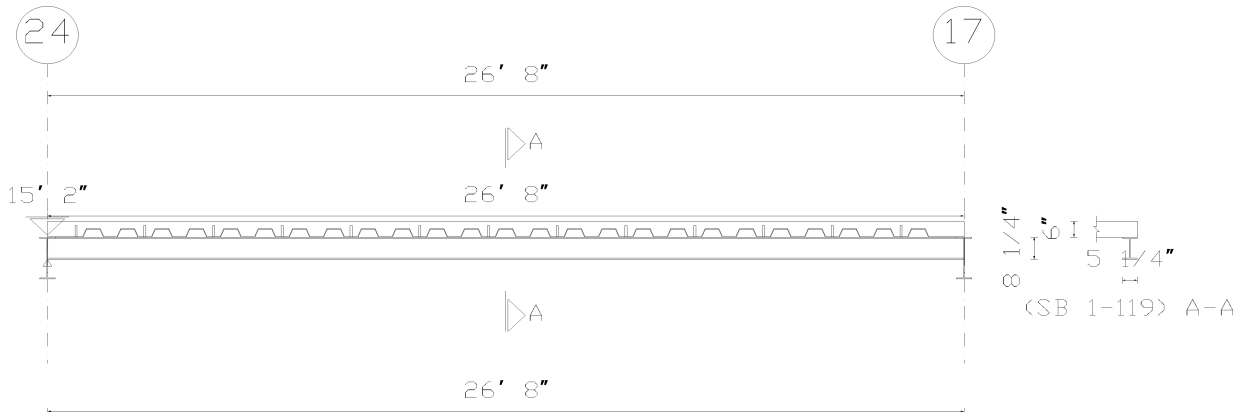
Span over limit =0.785 in

Design limit =0.785 in

Utilization Ratio =0.357

✓ Pass

SB 1-119



Second Level: SB 1-119 = 1
W 8x21 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	26' 8"	•	1.000		1.000		1.000		1.000
support	26' 8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	25' 4"	13	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 2' 4 3/4" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x21 (13)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.832	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-8.4	62.1	kip	0.136	✓ Pass
Flexure	2	56.1	135.1	kip ft	0.415	✓ Pass
Connector Resistance	2	6	13		-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.110	-	in	-	
Deflection Slab	2	0.729	1.333	in	0.547	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Dead	2	0.075	0.889	in	0.085	✓ Pass
Deflection Live	2	0.376	0.889	in	0.423	✓ Pass
Deflection Post Composite	2	0.451	0.889	in	0.508	✓ Pass
Deflection Total	2	1.290	1.333	in	0.968	✓ Pass

Construction Stage

W 8x21(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.4	62.1	kip	0.054	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	22.5	76.5	kip ft	0.294	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.110	-	in	-	-
Deflection Total	1	1.109	1.333	in	0.832	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x21 A992-50 - Critical

Flexural: Position 13' 4" - Critical

Moment, M_x = 22.5 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x21 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 3.4 kip

Design shear strength = 62.1 kip AISC 360 G2

Ratio = 0.054



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x21 A992-50 - Critical

Yielding: 13' 4" - Critical

Dist of M_{rx} along member = 13' 4" ft, in

Required flexural strength, M_{rx1} = 22.5 kip ft

Design flexural strength = 76.5 kip ft AISC 360 F1, F2 and F3

Ratio = 0.294



Pass

Deflection



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1 Construction Stage

Span 1 W 8x21 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =13' 4" ft, in
Max. Total load deflection =1.109 in
Span over limit =1.333 in
Design limit =1.333 in
Utilization Ratio =**0.832**



Pass

Classification2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

Position 13' 4" - Critical

Web class Compact AISC 360 Table B4.1b
h / t_w =**27.500**
h / t_w limit for plastic stress distribution =**90.553**

Vertical Shear2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

Position 26' 8" - Critical

Position of V_{ry} =26' 8" ft, in
Required major axis shear strength, V_{ry} =8.4 kip
Design shear strength =62.1 kip AISC 360 G2
Ratio =**0.136**



Pass

Flexure2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

13' 4" Max Moment Position - Critical

Distance of M along member =13' 4" ft, in
Required flexural strength, M_x =56.1 kip ft
Design flexural strength =135.1 kip ft
Ratio =**0.415**



Pass

Connector Resistance2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x21 A992-50 - Critical

13' 4" Max Moment and UR Position - Critical

Layout and strength of shear connectors
Maximum group spacing, s =2' 0" ft, in
Maximum permitted group spacing =3' 0" ft, in
Number of shear connectors over full beam length 13
Number of shear connectors to critical point, N_a 6
Degree of shear connection =**0.353**
Absolute minimum degree of shear connection =**0.250**
Optimum amount of shear connection =**0.500**
Partial shear connection



Pass

Deflection2 LRFD₂-1.2D+1.6L - Critical

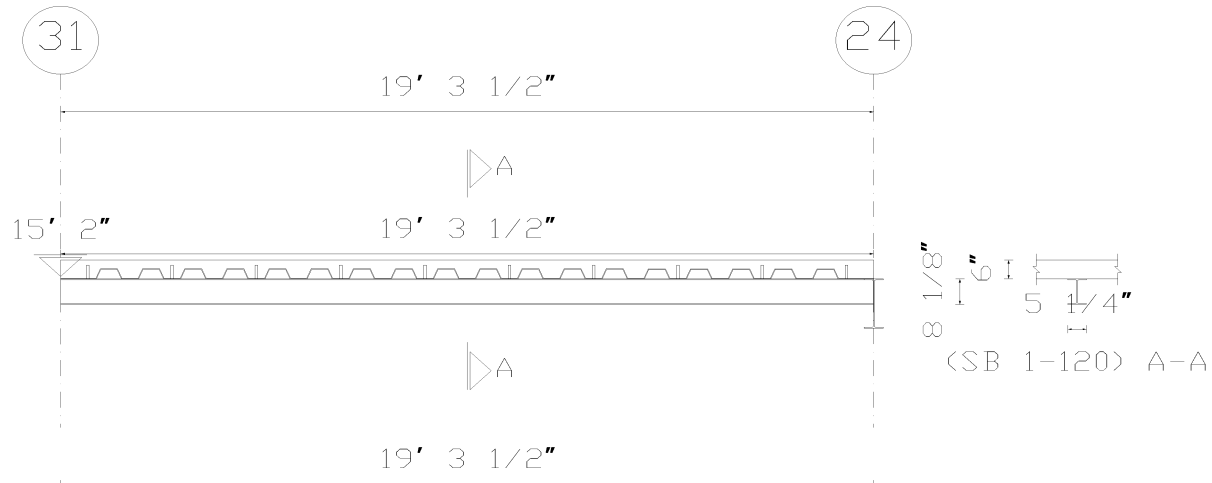
Span 1 W 8x21 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as}	=381.4 in ⁴
Long term inertia, I_{al}	=381.4 in ⁴
Short term inertia @ partial interaction, I_{as}	=257.0 in ⁴
Long term inertia @ partial interaction, I_{al}	=257.0 in ⁴
Position Total load deflection	=13' 4" ft, in
Deflection with full shear connection n, δ	=1.148 in
Deflection of steel beam alone, δ_s	=2.347 in
Minimum degree of shear connection	=35.25 %
Deflection with partial shear connection, δ	=1.290 in
Span over limit	=1.333 in
Design limit	=1.333 in
Utilization Ratio	=0.968

✓ Pass

SB 1-120



Second Level: SB 1-120 - 1
W 8x18 A992-50 (10) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	19' 3 1/2"	•	1.000		1.000		1.000		1.000
support	19' 3 1/2"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	19' 3 1/2"	10	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi



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Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
 6" ft, in 4' 8 3/4" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
 Type Area Yield strength Type Area Yield strength
 Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (10)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.719	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	11.8	56.2	kip	0.209	✓ Pass
Flexure	2	56.7	115.4	kip ft	0.492	✓ Pass
Connector Resistance	2	5	10	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.032	-	in	-	-
Deflection Slab	2	0.483	0.965	in	0.501	✓ Pass
Deflection Dead	2	0.043	0.643	in	0.067	✓ Pass
Deflection Live	2	0.215	0.643	in	0.335	✓ Pass
Deflection Post Composite	2	0.258	0.643	in	0.402	✓ Pass
Deflection Total	2	0.773	0.965	in	0.802	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	4.6	56.2	kip	0.081	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	22.0	63.7	kip ft	0.345	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.032	-	in	-	-
Deflection Total	1	0.694	0.965	in	0.719	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 9' 7 3/4" - Critical

Moment, M_x =22.0 kip ftElastic modulus of steel, E =29000 ksiMinimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical



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Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 4.6 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.081



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 9' 7 3/4" - Critical

Dist of M_{rx} along member = 9' 7 3/4" ft, inRequired flexural strength, M_{rx1} = 22.0 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.345



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 9' 7 3/4" ft, in

Max. Total load deflection = 0.694 in

Span over limit = 0.965 in

Design limit = 0.965 in

Utilization Ratio = 0.719



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 9' 7 3/4" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w = 29.900 h / t_w limit for plastic stress distribution = 90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 11.8 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.209



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

9' 7 3/4" Max Moment Position - Critical

Distance of M along member = 9' 7 3/4" ft, in

Required flexural strength, M_x = 56.7 kip ft

Design flexural strength = 115.4 kip ft

Ratio = 0.492

✓ Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

9' 7 3/4" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 10

Number of shear connectors to critical point, N_a 5

Degree of shear connection = 0.328

Absolute minimum degree of shear connection = 0.250

Optimum amount of shear connection = 0.500

Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 391.2 in⁴

Long term inertia, I_{al} = 391.2 in⁴

Short term inertia @ partial interaction, I_{as} = 250.4 in⁴

Long term inertia @ partial interaction, I_{al} = 250.4 in⁴

Position Total load deflection = 9' 7 3/4" ft, in

Deflection with full shear connection n, δ = 0.686 in

Deflection of steel beam alone, δ_s = 1.514 in

Minimum degree of shear connection = 32.76 %

Deflection with partial shear connection, δ = 0.773 in

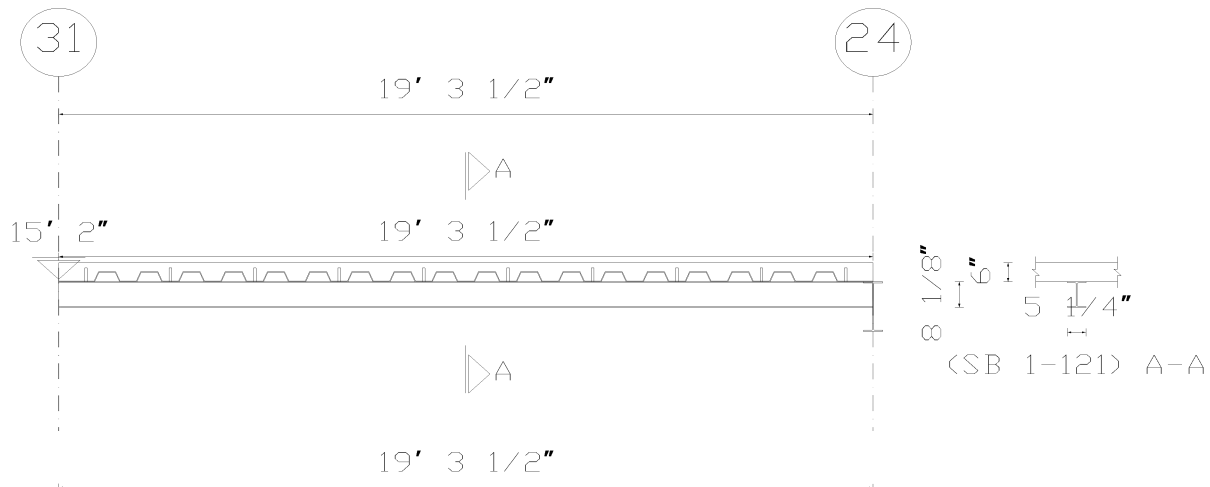
Span over limit = 0.965 in

Design limit = 0.965 in

Utilization Ratio = 0.802

✓ Pass

SB 1-121



Second Level: SB 1-121 = 1
 W 8x18 A992-50 (10) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	19' 3 1/2"	•	1.000		1.000		1.000		1.000
support	19' 3 1/2"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	19' 3 1/2"	10	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 6 3/4" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (10)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.695	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	11.3	56.2	kip	0.202	✓ Pass
Flexure	2	54.7	115.4	kip ft	0.474	✓ Pass
Connector Resistance	2	5	10	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.032	-	in	-	-
Deflection Slab	2	0.466	0.965	in	0.483	✓ Pass
Deflection Dead	2	0.042	0.643	in	0.065	✓ Pass
Deflection Live	2	0.209	0.643	in	0.325	✓ Pass
Deflection Post Composite	2	0.251	0.643	in	0.390	✓ Pass
Deflection Total	2	0.748	0.965	in	0.776	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	4.4	56.2	kip	0.078	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	21.2	63.7	kip ft	0.333	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Self weight	1	0.032	-	in	-	-
Deflection Total	1	0.670	0.965	in	0.695	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 9' 7 3/4" - Critical

Moment, M_x =21.2 kip ftElastic modulus of steel, E =29000 ksiMinimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =4.4 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.078



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 9' 7 3/4" - Critical

Dist of M_{rx} along member =9' 7 3/4" ft, inRequired flexural strength, M_{rx1} =21.2 kip ft

Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3

Ratio =0.333



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =9' 7 3/4" ft, in

Max. Total load deflection =0.670 in

Span over limit =0.965 in

Design limit =0.965 in

Utilization Ratio =0.695



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 9' 7 3/4" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w =29.900 h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_y = 0" ft, in

Required major axis shear strength, V_y = 11.3 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = **0.202**

✓ Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

9' 7 3/4" Max Moment Position - Critical

Distance of M along member = 9' 7 3/4" ft, in

Required flexural strength, M_x = 54.7 kip ft

Design flexural strength = 115.4 kip ft

Ratio = **0.474**

✓ Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

9' 7 3/4" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 10

Number of shear connectors to critical point, N_a 5

Degree of shear connection = **0.328**

Absolute minimum degree of shear connection = **0.250**

Optimum amount of shear connection = **0.500**

Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 388.5 in⁴

Long term inertia, I_{al} = 388.5 in⁴

Short term inertia @ partial interaction, I_{as} = 248.8 in⁴

Long term inertia @ partial interaction, I_{al} = 248.8 in⁴

Position Total load deflection = 9' 7 3/4" ft, in

Deflection with full shear connection n , δ = 0.663 in

Deflection of steel beam alone, δ_s = 1.461 in

Minimum degree of shear connection = 32.76 %

Deflection with partial shear connection, δ = 0.748 in

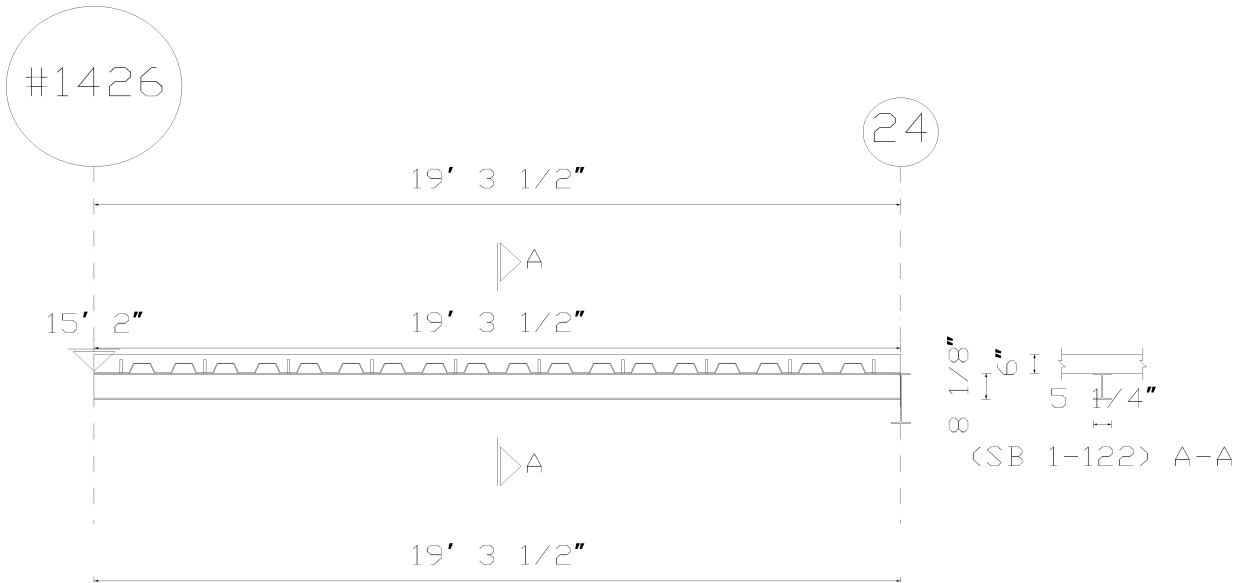
Span over limit = 0.965 in

Design limit = 0.965 in

Utilization Ratio = **0.776**

✓ Pass

SB 1-122



Second Level: SB 1-122 = 1
W 8x18 A992-50 (10) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	19' 3 1/2"	•	1.000		1.000		1.000		1.000
support	19' 3 1/2"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	19' 3 1/2"	10	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (10)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.711	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Vertical Shear	2	11.6	56.2	kip	0.207	✓ Pass
Flexure	2	56.1	115.4	kip ft	0.486	✓ Pass
Connector Resistance	2	5	10		-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.032	-	in	-	-
Deflection Slab	2	0.477	0.965	in	0.495	✓ Pass
Deflection Dead	2	0.043	0.643	in	0.066	✓ Pass
Deflection Live	2	0.213	0.643	in	0.332	✓ Pass
Deflection Post Composite	2	0.256	0.643	in	0.398	✓ Pass
Deflection Total	2	0.765	0.965	in	0.793	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	4.5	56.2	kip	0.080	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	21.7	63.7	kip ft	0.341	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.032	-	in	-	-
Deflection Total	1	0.686	0.965	in	0.711	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 9' 7 3/4" - Critical

Moment, M_x = 21.7 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 4.5 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.080

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 9' 7 3/4" - Critical



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Dist of M_{rx} along member = 9' 7 3/4" ft, in
Required flexural strength, M_{rx1} = 21.7 kip ft
Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3
Ratio = **0.341**



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 9' 7 3/4" ft, in
Max. Total load deflection = 0.686 in
Span over limit = 0.965 in
Design limit = 0.965 in
Utilization Ratio = **0.711**



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 9' 7 3/4" - Critical

Web class Compact AISC 360 Table B4.1b
 h / t_w = **29.900**
 h / t_w limit for plastic stress distribution = **90.553**

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in
Required major axis shear strength, V_{ry} = 11.6 kip
Design shear strength = 56.2 kip AISC 360 G2
Ratio = **0.207**



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

9' 7 3/4" Max Moment Position - Critical

Distance of M along member = 9' 7 3/4" ft, in
Required flexural strength, M_x = 56.1 kip ft
Design flexural strength = 115.4 kip ft
Ratio = **0.486**



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

9' 7 3/4" Max Moment and UR Position - Critical

Layout and strength of shear connectors
Maximum group spacing, s = 2' 0" ft, in
Maximum permitted group spacing = 3' 0" ft, in
Number of shear connectors over full beam length 10
Number of shear connectors to critical point, N_a 5
Degree of shear connection = **0.328**

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} =390.2 in⁴

Long term inertia, I_{aL} =390.2 in⁴

Short term inertia @ partial interaction, I_{as} =249.8 in⁴

Long term inertia @ partial interaction, I_{aL} =249.8 in⁴

Position Total load deflection =9' 7 3/4" ft, in

Deflection with full shear connection δ =0.678 in

Deflection of steel beam alone, δ_s =1.496 in

Minimum degree of shear connection =32.76 %

Deflection with partial shear connection, δ =0.765 in

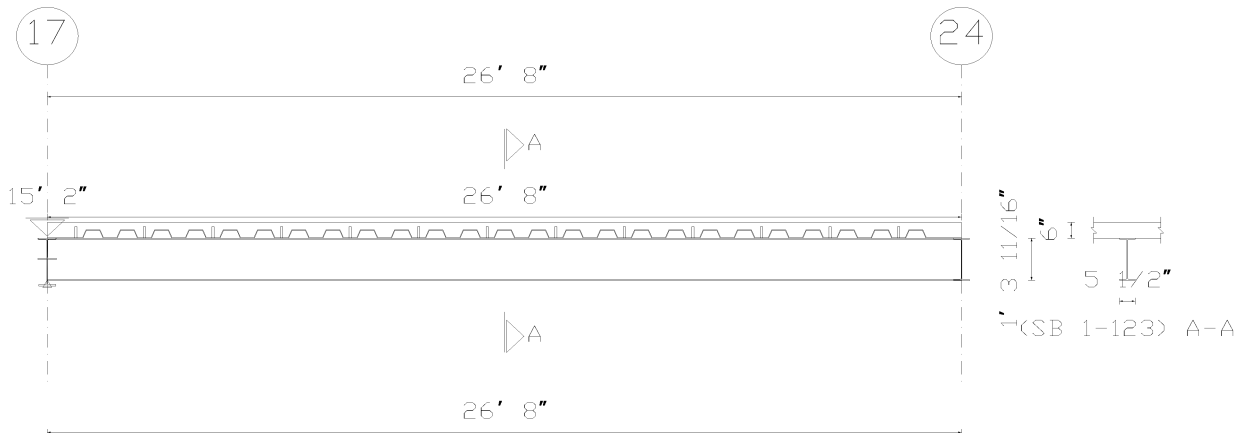
Span over limit =0.965 in

Design limit =0.965 in

Utilization Ratio =0.793

✓ Pass

SB 1-123



Second Level: SB 1-123 = 1
W 16x26 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	26' 8"	•	1.000		1.000		1.000		1.000
support	26' 8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	25' 4"	13	1	2



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Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 0" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 16x26 (13)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.343	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	13.9	106.0	kip	0.132	✓ Pass
Flexure	2	93.0	254.8	kip ft	0.365	✓ Pass
Connector Resistance	2	6	13	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.035	-	in	-	-
Deflection Slab	2	0.308	1.333	in	0.231	✓ Pass
Deflection Dead	2	0.044	0.889	in	0.050	✓ Pass
Deflection Live	2	0.222	0.889	in	0.249	✓ Pass
Deflection Post Composite	2	0.266	0.889	in	0.299	✓ Pass
Deflection Total	2	0.609	1.333	in	0.457	✓ Pass

Construction Stage

W 16x26(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	5.5	106.0	kip	0.052	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	36.7	165.7	kip ft	0.222	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.035	-	in	-	-
Deflection Total	1	0.457	1.333	in	0.343	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 13' 4" - Critical

Moment, M_x = 36.7 kip ftElastic modulus of steel, E = 29000 ksiMinimum yield stress, F_y = 50.00 ksi



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Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 5.5 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.052



Pass

Flexure Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Yielding: 13' 4" - Critical

Dist of M_{rx} along member = 13' 4" ft, inRequired flexural strength, M_{rx1} = 36.7 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.222



Pass

Deflection

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 13' 4" ft, in

Max. Total load deflection = 0.457 in

Span over limit = 1.333 in

Design limit = 1.333 in

Utilization Ratio = 0.343



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 13' 4" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w = 56.800 h / t_w limit for plastic stress distribution = 90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 13.9 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.132



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

13' 4" Max Moment Position - Critical



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Distance of M along member =13' 4" ft, in
Required flexural strength, M_x =93.0 kip ft
Design flexural strength =254.8 kip ft
Ratio =**0.365**

✓ Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

13' 4" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 13

Number of shear connectors to critical point, N_a 6Degree of shear connection =**0.269**Absolute minimum degree of shear connection =**0.250**Optimum amount of shear connection =**0.500**

Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} =1147.7 in⁴Long term inertia, I_{aL} =1147.7 in⁴Short term inertia @ partial interaction, I_{as} =740.3 in⁴Long term inertia @ partial interaction, I_{aL} =740.3 in⁴

Position Total load deflection =13' 4" ft, in

Deflection with full shear connection n , δ =0.519 inDeflection of steel beam alone, δ_s =0.980 in

Minimum degree of shear connection =26.92 %

Deflection with partial shear connection, δ =0.609 in

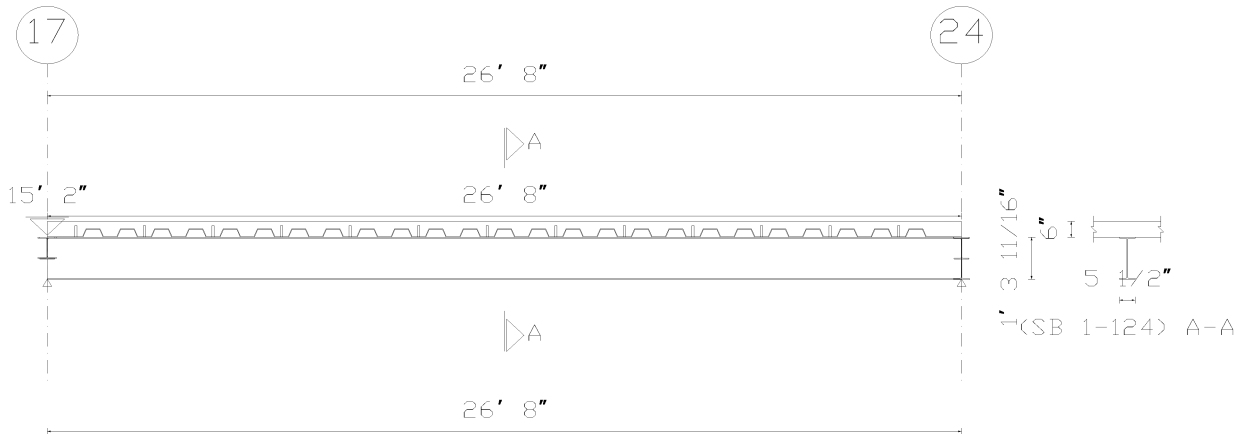
Span over limit =1.333 in

Design limit =1.333 in

Utilization Ratio =**0.457**

✓ Pass

SB 1-124



Second Level: SB 1-124 = 1
W 16x26 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	26' 8"	•	1.000		1.000		1.000		1.000
support	26' 8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	25' 4"	13	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 1" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 16x26 (13)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.349	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	14.2	106.0	kip	0.134	✓ Pass
Flexure	2	94.8	254.8	kip ft	0.372	✓ Pass
Connector Resistance	2	6	13		-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.035	-	in	-	

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Slab	2	0.315	1.333	in	0.236	✓ Pass
Deflection Dead	2	0.045	0.889	in	0.051	✓ Pass
Deflection Live	2	0.226	0.889	in	0.254	✓ Pass
Deflection Post Composite	2	0.271	0.889	in	0.305	✓ Pass
Deflection Total	2	0.620	1.333	in	0.465	✓ Pass

Construction Stage

W 16x26(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	5.6	106.0	kip	0.053	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	37.4	165.7	kip ft	0.226	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.035	-	in	-	-
Deflection Total	1	0.466	1.333	in	0.349	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 13' 4" - Critical

Moment, M_x = 37.4 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 5.6 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.053



Pass

Flexure Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Yielding: 13' 4" - Critical

Dist of M_{rx} along member = 13' 4" ft, in

Required flexural strength, M_{rx1} = 37.4 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.226



Pass

Deflection



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1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =13' 4" ft, in
Max. Total load deflection =0.466 in
Span over limit =1.333 in
Design limit =1.333 in
Utilization Ratio =**0.349**



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 13' 4" - Critical

Web class Compact AISC 360 Table B4.1b
h / t_w =**56.800**
h / t_w limit for plastic stress distribution =**90.553**

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in
Required major axis shear strength, V_{ry} =14.2 kip
Design shear strength =106.0 kip AISC 360 G2
Ratio =**0.134**



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

13' 4" Max Moment Position - Critical

Distance of M along member =13' 4" ft, in
Required flexural strength, M_x =94.8 kip ft
Design flexural strength =254.8 kip ft
Ratio =**0.372**



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

13' 4" Max Moment and UR Position - Critical

Layout and strength of shear connectors
Maximum group spacing, s =2' 0" ft, in
Maximum permitted group spacing =3' 0" ft, in
Number of shear connectors over full beam length 13
Number of shear connectors to critical point, N_a 6
Degree of shear connection =**0.269**
Absolute minimum degree of shear connection =**0.250**
Optimum amount of shear connection =**0.500**
Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

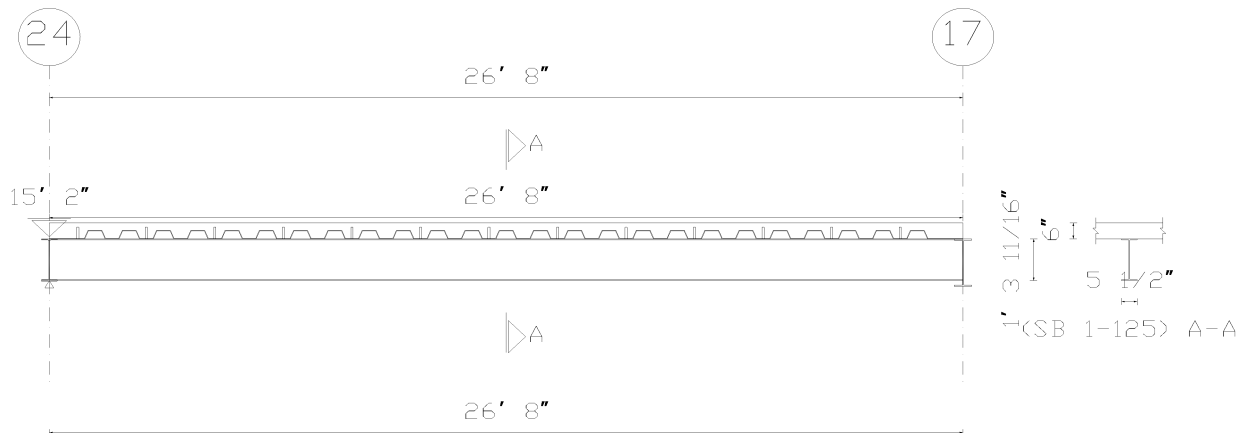
Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as}	=1152.9 in ⁴
Long term inertia, I_{al}	=1152.9 in ⁴
Short term inertia @ partial interaction, I_{as}	=743.0 in ⁴
Long term inertia @ partial interaction, I_{al}	=743.0 in ⁴
Position Total load deflection	=13' 4" ft, in
Deflection with full shear connection n, δ	=0.528 in
Deflection of steel beam alone, δ_s	=1.000 in
Minimum degree of shear connection	=26.92 %
Deflection with partial shear connection, δ	=0.620 in
Span over limit	=1.333 in
Design limit	=1.333 in
Utilization Ratio	=0.465

✓ Pass

SB 1-125



Second Level: SB 1-125 = 1
W 16x26 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	26' 8"	•	1.000		1.000		1.000		1.000
support	26' 8"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	25' 4"	13	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'



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6" ft, in 4' 3 3/4" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement

Reinforcement for crack control or fire requirements

Type	Area	Yield strength	Type	Area	Yield strength
Deformed # 3 @ 8"	0.17 in ² /ft	60.00 ksi	6x6 W1.4xW1.4	0.03 in ² /ft	65.00 ksi

Static Design Summary

Summary W 16x26 (13)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.367	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	15.0	106.0	kip	0.141	✓ Pass
Flexure	2	99.8	255.0	kip ft	0.392	✓ Pass
Connector Resistance	2	6	13	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.035	-	in	-	-
Deflection Slab	2	0.332	1.333	in	0.249	✓ Pass
Deflection Dead	2	0.047	0.889	in	0.053	✓ Pass
Deflection Live	2	0.236	0.889	in	0.265	✓ Pass
Deflection Post Composite	2	0.283	0.889	in	0.318	✓ Pass
Deflection Total	2	0.649	1.333	in	0.487	✓ Pass

Construction Stage

W 16x26(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	5.9	106.0	kip	0.056	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	39.3	165.7	kip ft	0.237	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.035	-	in	-	-
Deflection Total	1	0.489	1.333	in	0.367	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 13' 4" - Critical

Moment, M_x = 39.3 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical



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Position of V_{ry} = 0" ft, in
Required major axis shear strength, V_{ry} = 5.9 kip
Design shear strength = 106.0 kip AISC 360 G2
Ratio = **0.056**



Pass

Flexure Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Yielding: 13' 4" - Critical

Dist of M_{rx} along member = 13' 4" ft, in
Required flexural strength, M_{rx1} = 39.3 kip ft
Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3
Ratio = **0.237**



Pass

Deflection

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 13' 4" ft, in
Max. Total load deflection = 0.489 in
Span over limit = 1.333 in
Design limit = 1.333 in
Utilization Ratio = **0.367**



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 13' 4" - Critical

Web class Compact AISC 360 Table B4.1b
 h / t_w = **56.800**
 h / t_w limit for plastic stress distribution = **90.553**

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in
Required major axis shear strength, V_{ry} = 15.0 kip
Design shear strength = 106.0 kip AISC 360 G2
Ratio = **0.141**



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

13' 4" Max Moment Position - Critical

Distance of M along member = 13' 4" ft, in
Required flexural strength, M_x = 99.8 kip ft
Design flexural strength = 255.0 kip ft
Ratio = **0.392**



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

13' 4" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 13

Number of shear connectors to critical point, N_a 6

Degree of shear connection = 0.269

Absolute minimum degree of shear connection = 0.250

Optimum amount of shear connection = 0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 1166.6 in⁴

Long term inertia, I_{al} = 1166.6 in⁴

Short term inertia @ partial interaction, I_{as} = 750.1 in⁴

Long term inertia @ partial interaction, I_{al} = 750.1 in⁴

Position Total load deflection = 13' 4" ft, in

Deflection with full shear connection n , δ = 0.553 in

Deflection of steel beam alone, δ_s = 1.052 in

Minimum degree of shear connection = 26.92 %

Deflection with partial shear connection, δ = 0.649 in

Span over limit = 1.333 in

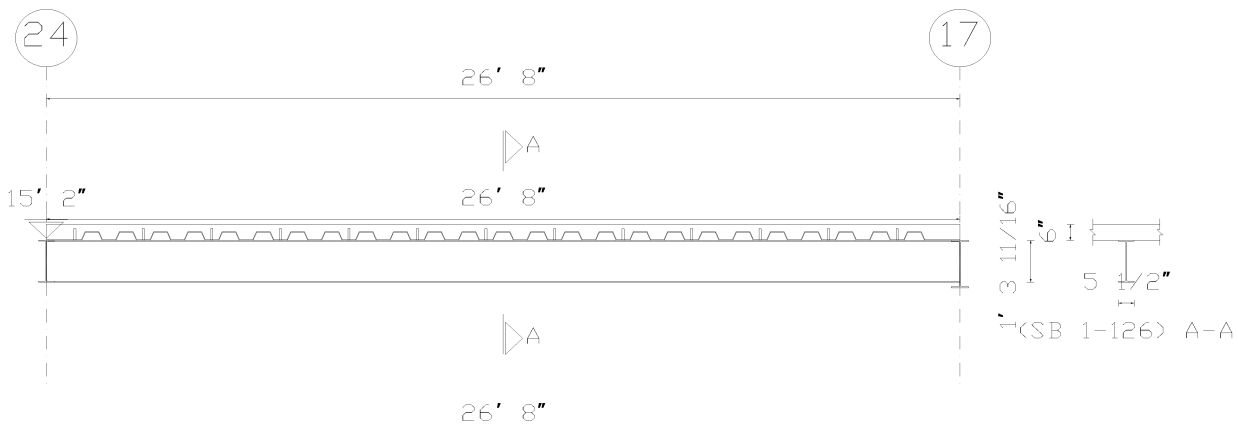
Design limit = 1.333 in

Utilization Ratio = 0.487



Pass

SB 1-126



Second Level: SB 1-126 = 1
 W 16x26 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	26' 8"	•	1.000		1.000		1.000		1.000
support	26' 8"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength

AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	25' 4"	13	1	2

Decking

Manufacturer Name Gauge Yield strength

VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'

6" ft, in 4' 5 3/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements

Type Area Yield strength Type Area Yield strength

Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 16x26 (13)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.378	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-15.4	106.0	kip	0.146	✓ Pass
Flexure	2	102.9	255.0	kip ft	0.404	✓ Pass
Connector Resistance	2	6	13	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.035	-	in	-	-
Deflection Slab	2	0.342	1.333	in	0.257	✓ Pass
Deflection Dead	2	0.048	0.889	in	0.054	✓ Pass
Deflection Live	2	0.242	0.889	in	0.272	✓ Pass
Deflection Post Composite	2	0.290	0.889	in	0.327	✓ Pass
Deflection Total	2	0.667	1.333	in	0.500	✓ Pass

Construction Stage

W 16x26(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	6.1	106.0	kip	0.057	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	40.5	165.7	kip ft	0.244	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.035	-	in	-	-



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Total	1	0.504	1.333	in	0.378	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 13' 4" - Critical

Moment, M_x = 40.5 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 6.1 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.057

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Yielding: 13' 4" - Critical

Dist of M_{rx} along member = 13' 4" ft, in

Required flexural strength, M_{rx1} = 40.5 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.244

✓ Pass

Deflection

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 13' 4" ft, in

Max. Total load deflection = 0.504 in

Span over limit = 1.333 in

Design limit = 1.333 in

Utilization Ratio = 0.378

✓ Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 13' 4" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w = 56.800

h / t_w limit for plastic stress distribution = 90.553

Vertical Shear



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2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 26' 8" - Critical

Position of V_y = 26' 8" ft, inRequired major axis shear strength, V_y = -15.4 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = **0.146**

Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

13' 4" Max Moment Position - Critical

Distance of M along member = 13' 4" ft, in

Required flexural strength, M_x = 102.9 kip ft

Design flexural strength = 255.0 kip ft

Ratio = **0.404**

Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

13' 4" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 13

Number of shear connectors to critical point, N_a 6Degree of shear connection = **0.269**Absolute minimum degree of shear connection = **0.250**Optimum amount of shear connection = **0.500**

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 1174.2 in⁴Long term inertia, I_{aL} = 1174.2 in⁴Short term inertia @ partial interaction, I_{as} = 754.1 in⁴Long term inertia @ partial interaction, I_{aL} = 754.1 in⁴

Position Total load deflection = 13' 4" ft, in

Deflection with full shear connection n , δ = 0.568 inDeflection of steel beam alone, δ_s = 1.085 in

Minimum degree of shear connection = 26.92 %

Deflection with partial shear connection, δ = 0.667 in

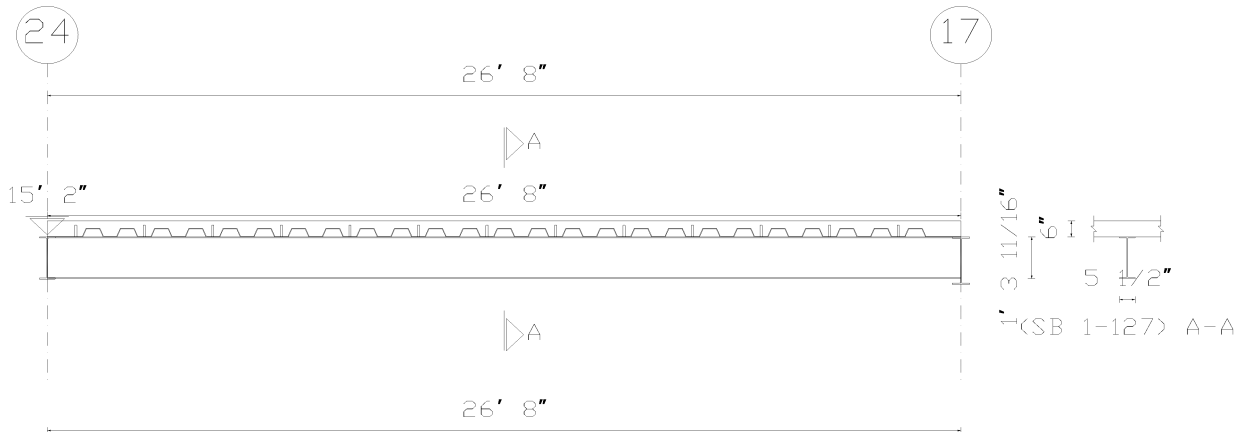
Span over limit = 1.333 in

Design limit = 1.333 in

Utilization Ratio = **0.500**

Pass

SB 1-127



Second Level: SB 1-127 = 1
W 16x26 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	26' 8"	•	1.000		1.000		1.000		1.000
support	26' 8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	25' 4"	13	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 16x26 (13)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.356	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-14.5	106.0	kip	0.137	✓ Pass
Flexure	2	96.7	254.9	kip ft	0.379	✓ Pass
Connector Resistance	2	6	13		-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.035	-	in	-	-

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Slab	2	0.321	1.333	in	0.241	✓ Pass
Deflection Dead	2	0.046	0.889	in	0.052	✓ Pass
Deflection Live	2	0.229	0.889	in	0.258	✓ Pass
Deflection Post Composite	2	0.275	0.889	in	0.310	✓ Pass
Deflection Total	2	0.631	1.333	in	0.473	✓ Pass

Construction Stage

W 16x26(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	5.7	106.0	kip	0.054	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	38.1	165.7	kip ft	0.230	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.035	-	in	-	-
Deflection Total	1	0.475	1.333	in	0.356	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 13' 4" - Critical

Moment, M_x = 38.1 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 5.7 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.054

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Yielding: 13' 4" - Critical

Dist of M_{rx} along member = 13' 4" ft, in

Required flexural strength, M_{rx} = 38.1 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.230

✓ Pass



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Deflection

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =13' 4" ft, in
Max. Total load deflection =0.475 in
Span over limit =1.333 in
Design limit =1.333 in
Utilization Ratio =0.356



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 13' 4" - Critical

Web class Compact AISC 360 Table B4.1b
h / t_w =56.800
h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 26' 8" - Critical

Position of V_{ry} =26' 8" ft, in
Required major axis shear strength, V_{ry} =-14.5 kip
Design shear strength =106.0 kip AISC 360 G2
Ratio =0.137



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

13' 4" Max Moment Position - Critical

Distance of M along member =13' 4" ft, in
Required flexural strength, M_x =96.7 kip ft
Design flexural strength =254.9 kip ft
Ratio =0.379



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

13' 4" Max Moment and UR Position - Critical

Layout and strength of shear connectors
Maximum group spacing, s =2' 0" ft, in
Maximum permitted group spacing =3' 0" ft, in
Number of shear connectors over full beam length 13
Number of shear connectors to critical point, N_a 6
Degree of shear connection =0.269
Absolute minimum degree of shear connection =0.250
Optimum amount of shear connection =0.500
Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 1158.0 in⁴

Long term inertia, I_{al} = 1158.0 in⁴

Short term inertia @ partial interaction, I_{as} = 745.7 in⁴

Long term inertia @ partial interaction, I_{al} = 745.7 in⁴

Position Total load deflection = 13' 4" ft, in

Deflection with full shear connection n, δ = 0.537 in

Deflection of steel beam alone, δ_s = 1.020 in

Minimum degree of shear connection = 26.92 %

Deflection with partial shear connection, δ = 0.631 in

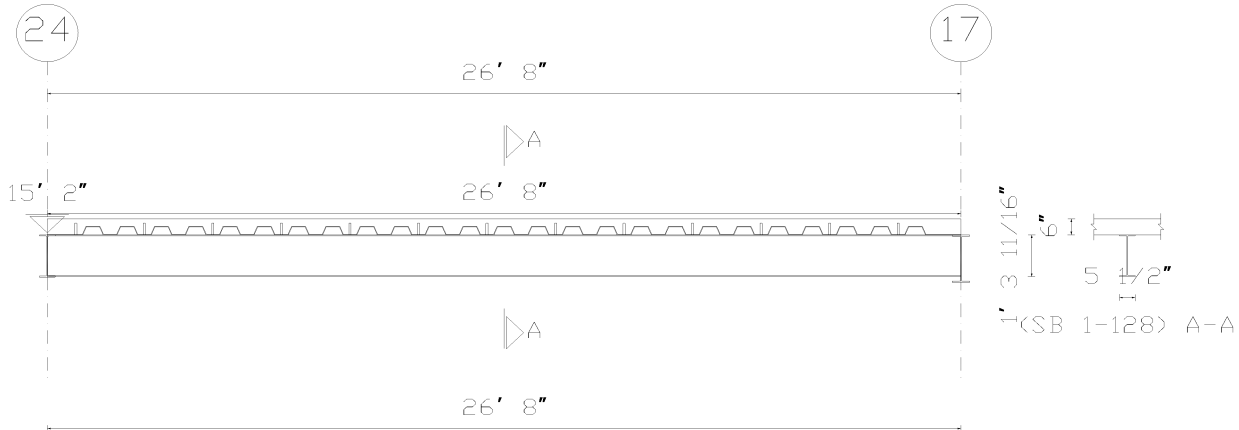
Span over limit = 1.333 in

Design limit = 1.333 in

Utilization Ratio = **0.473**

✓ Pass

SB 1-128



Second Level: SB 1-128 = 1
W 16x26 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	26' 8"	•	1.000		1.000		1.000		1.000
support	26' 8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	25' 4"	13	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab



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Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
 6" ft, in 4' 2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
 Type Area Yield strength Type Area Yield strength
 Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 16x26 (13)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.356	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-14.5	106.0	kip	0.137	✓ Pass
Flexure	2	96.7	254.9	kip ft	0.379	✓ Pass
Connector Resistance	2	6	13	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.035	-	in	-	-
Deflection Slab	2	0.321	1.333	in	0.241	✓ Pass
Deflection Dead	2	0.046	0.889	in	0.052	✓ Pass
Deflection Live	2	0.229	0.889	in	0.258	✓ Pass
Deflection Post Composite	2	0.275	0.889	in	0.310	✓ Pass
Deflection Total	2	0.631	1.333	in	0.473	✓ Pass

Construction Stage

W 16x26(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	5.7	106.0	kip	0.054	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	38.1	165.7	kip ft	0.230	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.035	-	in	-	-
Deflection Total	1	0.475	1.333	in	0.356	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 13' 4" - Critical

Moment, M_x = 38.1 kip ftElastic modulus of steel, E = 29000 ksiMinimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical



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Position of V_{ry} = 0" ft, in
Required major axis shear strength, V_{ry} = 5.7 kip
Design shear strength = 106.0 kip AISC 360 G2
Ratio = **0.054**



Pass

Flexure Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Yielding: 13' 4" - Critical

Dist of M_{rx} along member = 13' 4" ft, in
Required flexural strength, M_{rx1} = 38.1 kip ft
Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3
Ratio = **0.230**



Pass

Deflection

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 13' 4" ft, in
Max. Total load deflection = 0.475 in
Span over limit = 1.333 in
Design limit = 1.333 in
Utilization Ratio = **0.356**



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 13' 4" - Critical

Web class Compact AISC 360 Table B4.1b
 h / t_w = **56.800**
 h / t_w limit for plastic stress distribution = **90.553**

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 26' 8" - Critical

Position of V_{ry} = 26' 8" ft, in
Required major axis shear strength, V_{ry} = 14.5 kip
Design shear strength = 106.0 kip AISC 360 G2
Ratio = **0.137**



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

13' 4" Max Moment Position - Critical

Distance of M along member = 13' 4" ft, in
Required flexural strength, M_x = 96.7 kip ft
Design flexural strength = 254.9 kip ft
Ratio = **0.379**



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

13' 4" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 13

Number of shear connectors to critical point, N_a 6

Degree of shear connection = 0.269

Absolute minimum degree of shear connection = 0.250

Optimum amount of shear connection = 0.500

Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 1158.0 in⁴

Long term inertia, I_{al} = 1158.0 in⁴

Short term inertia @ partial interaction, I_{as} = 745.7 in⁴

Long term inertia @ partial interaction, I_{al} = 745.7 in⁴

Position Total load deflection = 13' 4" ft, in

Deflection with full shear connection n , δ = 0.537 in

Deflection of steel beam alone, δ_s = 1.020 in

Minimum degree of shear connection = 26.92 %

Deflection with partial shear connection, δ = 0.631 in

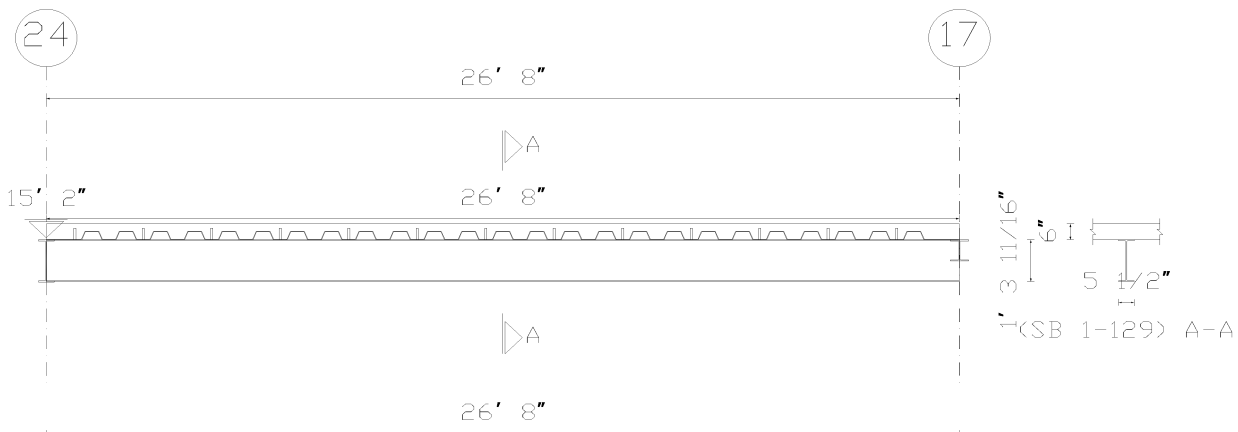
Span over limit = 1.333 in

Design limit = 1.333 in

Utilization Ratio = 0.473

✓ Pass

SB 1-129



Second Level: SB 1-129 = 1
 W 16x26 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	26' 8"	•	1.000		1.000		1.000		1.000
support	26' 8"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength

AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	25' 4"	13	1	2

Decking

Manufacturer Name Gauge Yield strength

VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'

6" ft, in 3' 10" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements

Type Area Yield strength Type Area Yield strength

Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 16x26 (13)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.330	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	13.4	106.0	kip	0.126	✓ Pass
Flexure	2	89.2	254.7	kip ft	0.350	✓ Pass
Connector Resistance	2	6	13	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.035	-	in	-	-
Deflection Slab	2	0.295	1.333	in	0.221	✓ Pass
Deflection Dead	2	0.043	0.889	in	0.048	✓ Pass
Deflection Live	2	0.214	0.889	in	0.241	✓ Pass
Deflection Post Composite	2	0.257	0.889	in	0.289	✓ Pass
Deflection Total	2	0.587	1.333	in	0.440	✓ Pass

Construction Stage

W 16x26(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	5.3	106.0	kip	0.050	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	35.3	165.7	kip ft	0.213	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.035	-	in	-	-



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Total	1	0.439	1.333	in	0.330	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 13' 4" - Critical

Moment, M_x = 35.3 kip ftElastic modulus of steel, E = 29000 ksiMinimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 5.3 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.050



Pass

Flexure Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Yielding: 13' 4" - Critical

Dist of M_{rx} along member = 13' 4" ft, inRequired flexural strength, M_{rx1} = 35.3 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.213



Pass

Deflection

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 13' 4" ft, in

Max. Total load deflection = 0.439 in

Span over limit = 1.333 in

Design limit = 1.333 in

Utilization Ratio = 0.330



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 13' 4" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w = 56.800 h / t_w limit for plastic stress distribution = 90.553

Vertical Shear



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2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_y = 0" ft, inRequired major axis shear strength, V_y = 13.4 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.126



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

13' 4" Max Moment Position - Critical

Distance of M along member = 13' 4" ft, in

Required flexural strength, M_x = 89.2 kip ft

Design flexural strength = 254.7 kip ft

Ratio = 0.350



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

13' 4" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 13

Number of shear connectors to critical point, N_a 6

Degree of shear connection = 0.269

Absolute minimum degree of shear connection = 0.250

Optimum amount of shear connection = 0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 1136.7 in⁴Long term inertia, I_{aL} = 1136.7 in⁴Short term inertia @ partial interaction, I_{as} = 734.6 in⁴Long term inertia @ partial interaction, I_{aL} = 734.6 in⁴

Position Total load deflection = 13' 4" ft, in

Deflection with full shear connection n , δ = 0.500 inDeflection of steel beam alone, δ_s = 0.941 in

Minimum degree of shear connection = 26.92 %

Deflection with partial shear connection, δ = 0.587 in

Span over limit = 1.333 in

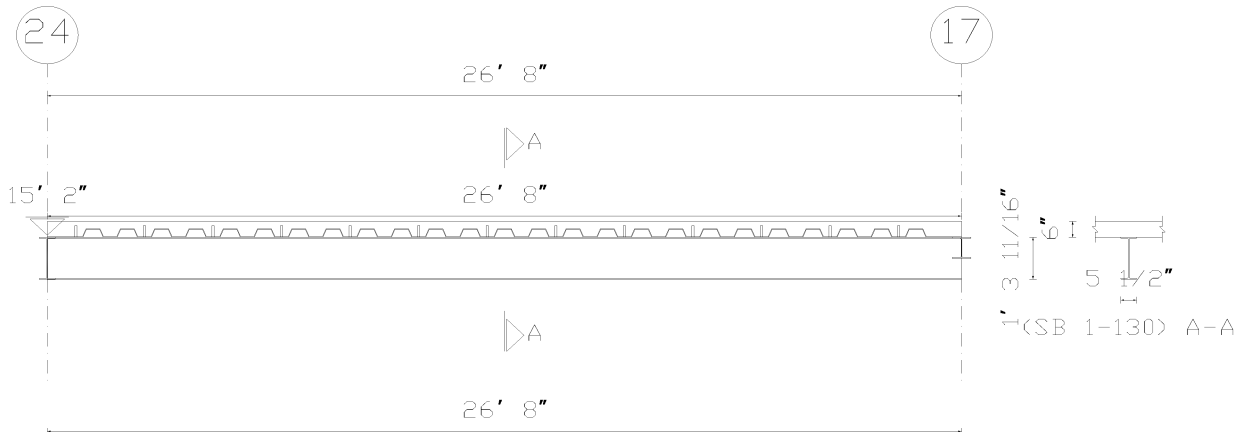
Design limit = 1.333 in

Utilization Ratio = 0.440



Pass

SB 1-130



Second Level: SB 1-130 = 1
W 16x26 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	26' 8"	•	1.000		1.000		1.000		1.000
support	26' 8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	25' 4"	13	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 3' 10" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 16x26 (13)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.330	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	13.4	106.0	kip	0.126	✓ Pass
Flexure	2	89.2	254.7	kip ft	0.350	✓ Pass
Connector Resistance	2	6	13		-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.035	-	in	-	-

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Slab	2	0.295	1.333	in	0.221	✓ Pass
Deflection Dead	2	0.043	0.889	in	0.048	✓ Pass
Deflection Live	2	0.214	0.889	in	0.241	✓ Pass
Deflection Post Composite	2	0.257	0.889	in	0.289	✓ Pass
Deflection Total	2	0.587	1.333	in	0.440	✓ Pass

Construction Stage

W 16x26(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	5.3	106.0	kip	0.050	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	35.3	165.7	kip ft	0.213	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.035	-	in	-	-
Deflection Total	1	0.439	1.333	in	0.330	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 13' 4" - Critical

Moment, M_x = 35.3 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 5.3 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.050



Pass

Flexure Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Yielding: 13' 4" - Critical

Dist of M_{rx} along member = 13' 4" ft, in

Required flexural strength, M_{rx1} = 35.3 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.213



Pass

Deflection



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1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =13' 4" ft, in
Max. Total load deflection =0.439 in
Span over limit =1.333 in
Design limit =1.333 in
Utilization Ratio =**0.330**



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 13' 4" - Critical

Web class Compact AISC 360 Table B4.1b
h / t_w =**56.800**
h / t_w limit for plastic stress distribution =**90.553**

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in
Required major axis shear strength, V_{ry} =13.4 kip
Design shear strength =106.0 kip AISC 360 G2
Ratio =**0.126**



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

13' 4" Max Moment Position - Critical

Distance of M along member =13' 4" ft, in
Required flexural strength, M_x =89.2 kip ft
Design flexural strength =254.7 kip ft
Ratio =**0.350**



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

13' 4" Max Moment and UR Position - Critical

Layout and strength of shear connectors
Maximum group spacing, s =2' 0" ft, in
Maximum permitted group spacing =3' 0" ft, in
Number of shear connectors over full beam length 13
Number of shear connectors to critical point, N_a 6
Degree of shear connection =**0.269**
Absolute minimum degree of shear connection =**0.250**
Optimum amount of shear connection =**0.500**
Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

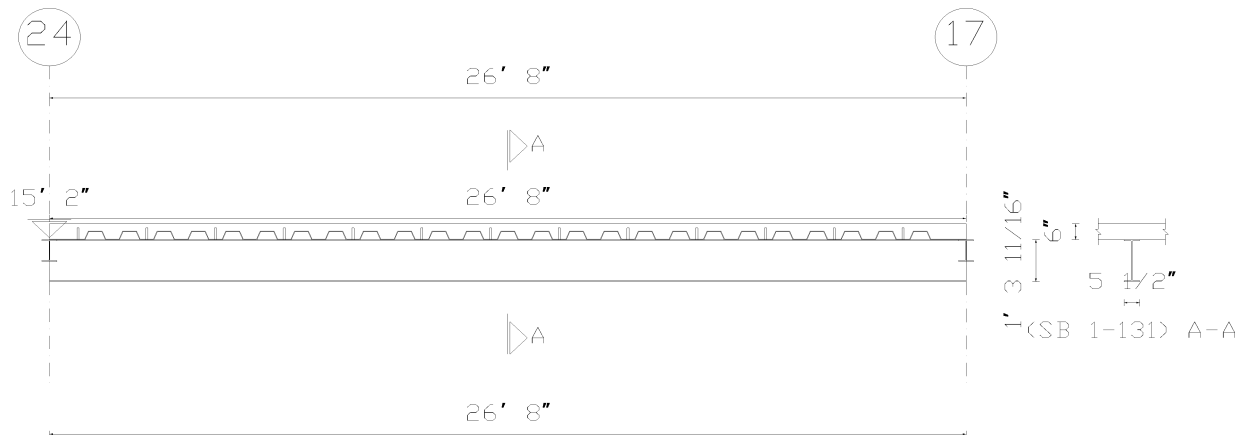
Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as}	=1136.7 in ⁴
Long term inertia, I_{al}	=1136.7 in ⁴
Short term inertia @ partial interaction, I_{as}	=734.6 in ⁴
Long term inertia @ partial interaction, I_{al}	=734.6 in ⁴
Position Total load deflection	=13' 4" ft, in
Deflection with full shear connection n , δ	=0.500 in
Deflection of steel beam alone, δ_s	=0.941 in
Minimum degree of shear connection	=26.92 %
Deflection with partial shear connection, δ	=0.587 in
Span over limit	=1.333 in
Design limit	=1.333 in
Utilization Ratio	=0.440

✓ Pass

SB 1-131



Second Level: SB 1-131 = 1
W 16x26 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	26' 8"	•	1.000		1.000		1.000		1.000
support	26' 8"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	25' 4"	13	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'



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6" ft, in 4' 4" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement

Reinforcement for crack control or fire requirements

Type	Area	Yield strength	Type	Area	Yield strength
Deformed # 3 @ 8"	0.17 in ² /ft	60.00 ksi	6x6 W1.4xW1.4	0.03 in ² /ft	65.00 ksi

Static Design Summary

Summary W 16x26 (13)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.369	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	15.1	106.0	kip	0.142	✓ Pass
Flexure	2	100.5	255.0	kip ft	0.394	✓ Pass
Connector Resistance	2	6	13	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.035	-	in	-	-
Deflection Slab	2	0.334	1.333	in	0.250	✓ Pass
Deflection Dead	2	0.047	0.889	in	0.053	✓ Pass
Deflection Live	2	0.237	0.889	in	0.267	✓ Pass
Deflection Post Composite	2	0.284	0.889	in	0.320	✓ Pass
Deflection Total	2	0.653	1.333	in	0.490	✓ Pass

Construction Stage

W 16x26(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	5.9	106.0	kip	0.056	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	39.5	165.7	kip ft	0.239	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.035	-	in	-	-
Deflection Total	1	0.492	1.333	in	0.369	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 13' 4" - Critical

Moment, M_x = 39.5 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical



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Position of V_{ry} = 0" ft, in
Required major axis shear strength, V_{ry} = 5.9 kip
Design shear strength = 106.0 kip AISC 360 G2
Ratio = **0.056**



Pass

Flexure Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Yielding: 13' 4" - Critical

Dist of M_{rx} along member = 13' 4" ft, in
Required flexural strength, M_{rx1} = 39.5 kip ft
Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3
Ratio = **0.239**



Pass

Deflection

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 13' 4" ft, in
Max. Total load deflection = 0.492 in
Span over limit = 1.333 in
Design limit = 1.333 in
Utilization Ratio = **0.369**



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 13' 4" - Critical

Web class Compact AISC 360 Table B4.1b
 h / t_w = **56.800**
 h / t_w limit for plastic stress distribution = **90.553**

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in
Required major axis shear strength, V_{ry} = 15.1 kip
Design shear strength = 106.0 kip AISC 360 G2
Ratio = **0.142**



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

13' 4" Max Moment Position - Critical

Distance of M along member = 13' 4" ft, in
Required flexural strength, M_x = 100.5 kip ft
Design flexural strength = 255.0 kip ft
Ratio = **0.394**



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

13' 4" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 13

Number of shear connectors to critical point, N_a 6

Degree of shear connection = 0.269

Absolute minimum degree of shear connection = 0.250

Optimum amount of shear connection = 0.500

Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 1167.8 in⁴

Long term inertia, I_{al} = 1167.8 in⁴

Short term inertia @ partial interaction, I_{as} = 750.7 in⁴

Long term inertia @ partial interaction, I_{al} = 750.7 in⁴

Position Total load deflection = 13' 4" ft, in

Deflection with full shear connection n , δ = 0.556 in

Deflection of steel beam alone, δ_s = 1.059 in

Minimum degree of shear connection = 26.92 %

Deflection with partial shear connection, δ = 0.653 in

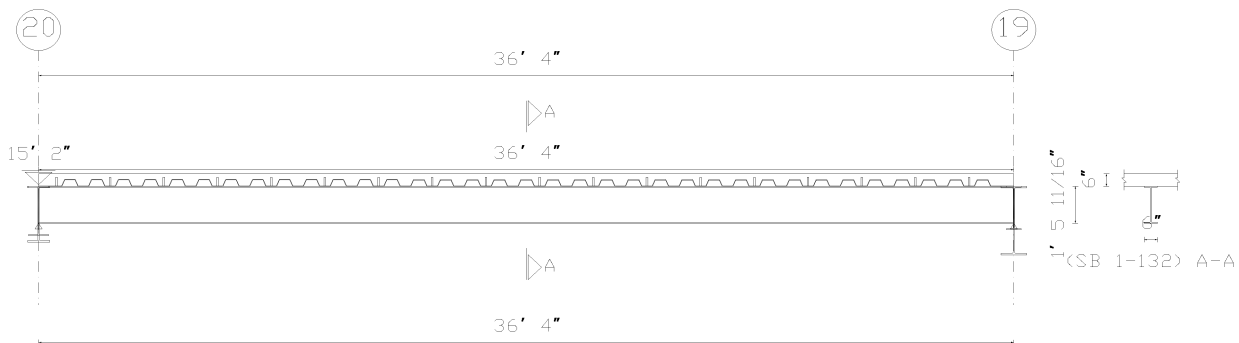
Span over limit = 1.333 in

Design limit = 1.333 in

Utilization Ratio = 0.490

✓ Pass

SB 1-132



Second Level: SB 1-132 = 1
W 18x35 A992-50 (18) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	36' 4"	•	1.000		1.000		1.000		1.000

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	36' 4"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	35' 2"	18	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 5 3/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 18x35 (18)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.574	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-21.2	159.3	kip	0.133	✓ Pass
Flexure	2	193.0	387.4	kip ft	0.498	✓ Pass
Connector Resistance	2	9	18	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.094	-	in	-	-
Deflection Slab	2	0.692	1.817	in	0.381	✓ Pass
Deflection Dead	2	0.104	1.211	in	0.086	✓ Pass
Deflection Live	2	0.518	1.211	in	0.428	✓ Pass
Deflection Post Composite	2	0.622	1.211	in	0.513	✓ Pass
Deflection Total	2	1.408	1.817	in	0.775	✓ Pass

Construction Stage

W 18x35(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	8.5	159.3	kip	0.053	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	76.9	249.4	kip ft	0.309	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.094	-	in	-	-
Deflection Total	1	1.043	1.817	in	0.574	✓ Pass



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Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Flexural: Position 18' 2" - Critical

Moment, M_x = 76.9 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 8.5 kip

Design shear strength = 159.3 kip AISC 360 G2

Ratio = 0.053



Pass

Flexure Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Yielding: 18' 2" - Critical

Dist of M_{rx} along member = 18' 2" ft, in

Required flexural strength, M_{rx1} = 76.9 kip ft

Design flexural strength = 249.4 kip ft AISC 360 F1, F2 and F3

Ratio = 0.309



Pass

Deflection

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 18' 2" ft, in

Max. Total load deflection = 1.043 in

Span over limit = 1.817 in

Design limit = 1.817 in

Utilization Ratio = 0.574



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 18' 2" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w = 53.500

h / t_w limit for plastic stress distribution = 90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical



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Position 36' 4" - Critical

Position of V_{ry} = 36' 4" ft, inRequired major axis shear strength, V_{ry} = -21.2 kip

Design shear strength = 159.3 kip AISC 360 G2

Ratio = 0.133



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2" Max Moment Position - Critical

Distance of M along member = 18' 2" ft, in

Required flexural strength, M_x = 193.0 kip ft

Design flexural strength = 387.4 kip ft

Ratio = 0.498



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 18

Number of shear connectors to critical point, N_a 9

Degree of shear connection = 0.301

Absolute minimum degree of shear connection = 0.250

Optimum amount of shear connection = 0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 1757.0 in⁴Long term inertia, I_{al} = 1757.0 in⁴Short term inertia @ partial interaction, I_{as} = 1194.3 in⁴Long term inertia @ partial interaction, I_{al} = 1194.3 in⁴

Position Total load deflection = 18' 2" ft, in

Deflection with full shear connection n , δ = 1.215 inDeflection of steel beam alone, δ_s = 2.219 in

Minimum degree of shear connection = 30.11 %

Deflection with partial shear connection, δ = 1.408 in

Span over limit = 1.817 in

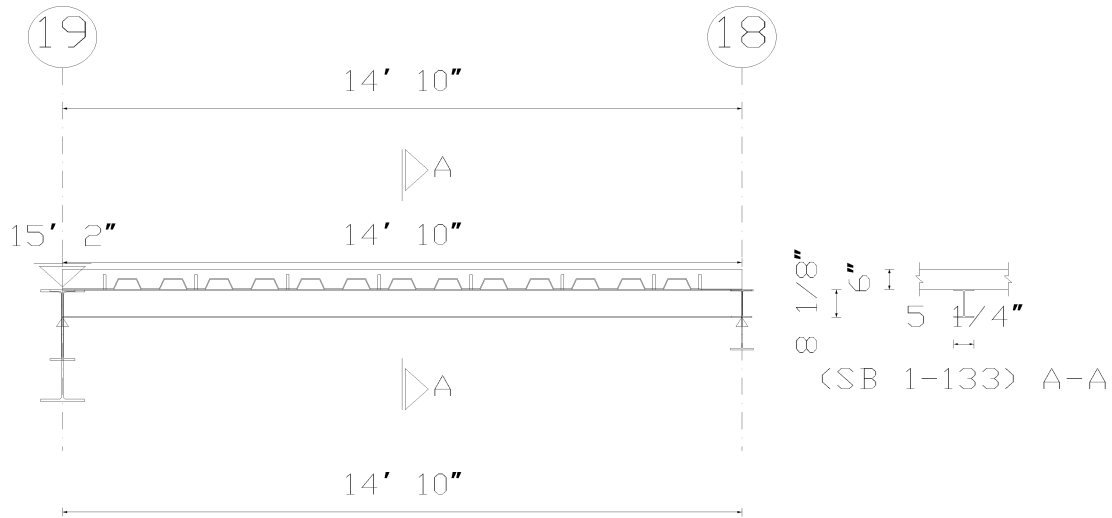
Design limit = 1.817 in

Utilization Ratio = 0.775



Pass

SB 1-133



Second Level: SB 1-133 - 1
W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	14' 10"	•	1.000		1.000		1.000		1.000
support	14' 10"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	11' 5"	6	1	2
12' 5"	14' 10"	2	1	1

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 3' 8 5/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.312	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	8.5	56.2	kip	0.152	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Flexure	2	31.6	107.0	kip ft	0.295	✓ Pass
Connector Resistance	2	4	8	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.011	-	in	-	-
Deflection Slab	2	0.161	0.742	in	0.217	✓ Pass
Deflection Dead	2	0.017	0.494	in	0.033	✓ Pass
Deflection Live	2	0.083	0.494	in	0.167	✓ Pass
Deflection Post Composite	2	0.099	0.494	in	0.201	✓ Pass
Deflection Total	2	0.271	0.742	in	0.365	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.3	56.2	kip	0.059	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	12.3	63.7	kip ft	0.192	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.011	-	in	-	-
Deflection Total	1	0.231	0.742	in	0.312	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 7' 5" - Critical

Moment, M_x = 12.3 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 3.3 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.059

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 5" - Critical

Dist of M_{rx} along member = 7' 5" ft, in

Required flexural strength, M_{rx1} = 12.3 kip ft



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Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3
Ratio =0.192



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =7' 5" ft, in

Max. Total load deflection =0.231 in

Span over limit =0.742 in

Design limit =0.742 in

Utilization Ratio =0.312



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 5" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w =29.900h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =8.5 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.152



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment Position - Critical

Distance of M along member =7' 5" ft, in

Required flexural strength, M_x =31.6 kip ft

Design flexural strength =107.0 kip ft

Ratio =0.295



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4

Degree of shear connection =0.262

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection

Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 372.3 in⁴

Long term inertia, I_{aL} = 372.3 in⁴

Short term inertia @ partial interaction, I_{as} = 220.8 in⁴

Long term inertia @ partial interaction, I_{aL} = 220.8 in⁴

Position Total load deflection = 7' 5" ft, in

Deflection with full shear connection n, δ = 0.234 in

Deflection of steel beam alone, δ_s = 0.504 in

Minimum degree of shear connection = 26.20 %

Deflection with partial shear connection, δ = 0.271 in

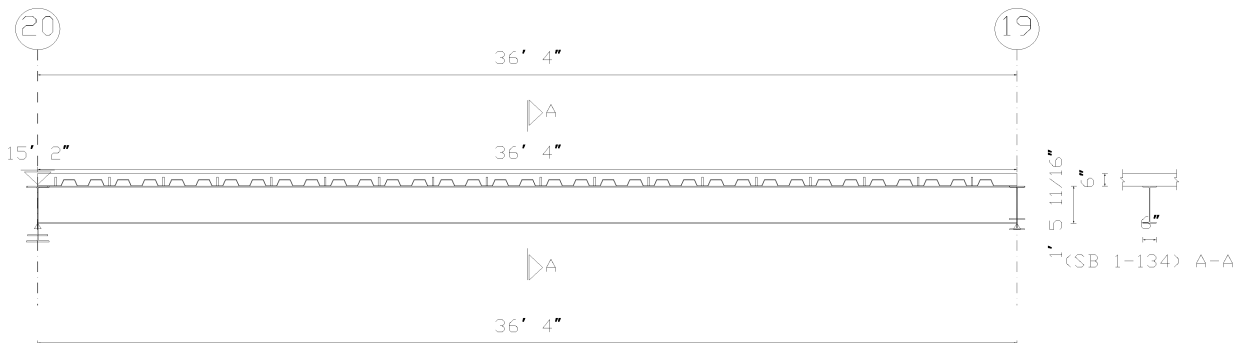
Span over limit = 0.742 in

Design limit = 0.742 in

Utilization Ratio = 0.365

Pass

SB 1-134



Second Level: SB 1-134 = 1
 W 18x35 A992-50 (18) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	36' 4"	•	1.000	•	1.000	•	1.000	•	1.000
support	36' 4"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
 AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	35' 2"	18	1	2

Decking

Manufacturer Name Gauge Yield strength
 VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab



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Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
 6" ft, in 4' 7 1/4" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
 Type Area Yield strength Type Area Yield strength
 Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 18x35 (18)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.593	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	22.0	159.3	kip	0.138	✓ Pass
Flexure	2	199.6	387.6	kip ft	0.515	✓ Pass
Connector Resistance	2	9	18	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.094	-	in	-	-
Deflection Slab	2	0.717	1.817	in	0.395	✓ Pass
Deflection Dead	2	0.107	1.211	in	0.088	✓ Pass
Deflection Live	2	0.533	1.211	in	0.440	✓ Pass
Deflection Post Composite	2	0.640	1.211	in	0.528	✓ Pass
Deflection Total	2	1.451	1.817	in	0.799	✓ Pass

Construction Stage

W 18x35(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	8.7	159.3	kip	0.055	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	79.4	249.4	kip ft	0.319	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.094	-	in	-	-
Deflection Total	1	1.077	1.817	in	0.593	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Flexural: Position 18' 2" - Critical

Moment, M_x = 79.4 kip ftElastic modulus of steel, E = 29000 ksiMinimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Position 0" - Critical



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Position of V_{ry} = 0" ft, in
Required major axis shear strength, V_{ry} = 8.7 kip
Design shear strength = 159.3 kip AISC 360 G2
Ratio = **0.055**



Pass

Flexure Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Yielding: 18' 2" - Critical

Dist of M_{rx} along member = 18' 2" ft, in
Required flexural strength, M_{rx1} = 79.4 kip ft
Design flexural strength = 249.4 kip ft AISC 360 F1, F2 and F3
Ratio = **0.319**



Pass

Deflection

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 18' 2" ft, in
Max. Total load deflection = 1.077 in
Span over limit = 1.817 in
Design limit = 1.817 in
Utilization Ratio = **0.593**



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 18' 2" - Critical

Web class Compact AISC 360 Table B4.1b
 h / t_w = **53.500**
 h / t_w limit for plastic stress distribution = **90.553**

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in
Required major axis shear strength, V_{ry} = 22.0 kip
Design shear strength = 159.3 kip AISC 360 G2
Ratio = **0.138**



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2" Max Moment Position - Critical

Distance of M along member = 18' 2" ft, in
Required flexural strength, M_x = 199.6 kip ft
Design flexural strength = 387.6 kip ft
Ratio = **0.515**



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 18

Number of shear connectors to critical point, N_a 9

Degree of shear connection = 0.301

Absolute minimum degree of shear connection = 0.250

Optimum amount of shear connection = 0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 1771.5 in⁴

Long term inertia, I_{aL} = 1771.5 in⁴

Short term inertia @ partial interaction, I_{as} = 1202.2 in⁴

Long term inertia @ partial interaction, I_{aL} = 1202.2 in⁴

Position Total load deflection = 18' 2" ft, in

Deflection with full shear connection n , δ = 1.251 in

Deflection of steel beam alone, δ_s = 2.294 in

Minimum degree of shear connection = 30.11 %

Deflection with partial shear connection, δ = 1.451 in

Span over limit = 1.817 in

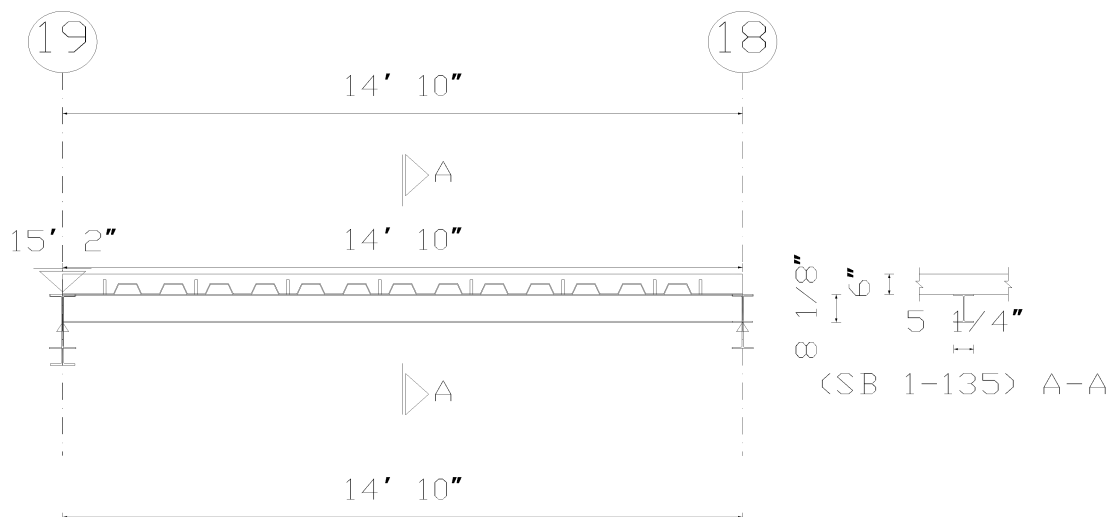
Design limit = 1.817 in

Utilization Ratio = 0.799



Pass

SB 1-135



Second Level: SB 1-135 = 1
 W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	14' 10"	•	1.000		1.000		1.000		1.000
support	14' 10"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	11' 5"	6	1	2
12' 5"	14' 10"	2	1	1

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 3' 8 5/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.322	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	8.8	56.2	kip	0.157	✓ Pass
Flexure	2	32.6	107.0	kip ft	0.305	✓ Pass
Connector Resistance	2	4	8	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.011	-	in	-	-
Deflection Slab	2	0.166	0.742	in	0.224	✓ Pass
Deflection Dead	2	0.017	0.494	in	0.035	✓ Pass
Deflection Live	2	0.085	0.494	in	0.173	✓ Pass
Deflection Post Composite	2	0.103	0.494	in	0.207	✓ Pass
Deflection Total	2	0.280	0.742	in	0.377	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.4	56.2	kip	0.061	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	12.6	63.7	kip ft	0.198	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.011	-	in	-	-
Deflection Total	1	0.239	0.742	in	0.322	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 7' 5" - Critical

Moment, M_x =12.6 kip ft

Elastic modulus of steel, E =29000 ksi

Minimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in

Required major axis shear strength, V_{ry} =3.4 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.061



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 5" - Critical

Dist of M_{rx} along member =7' 5" ft, in

Required flexural strength, M_{rx1} =12.6 kip ft

Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3

Ratio =0.198



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =7' 5" ft, in

Max. Total load deflection =0.239 in

Span over limit =0.742 in

Design limit =0.742 in

Utilization Ratio =0.322



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 5" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w =29.900



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h / t_w limit for plastic stress distribution = **90.553**

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 8.8 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = **0.157**



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment Position - Critical

Distance of M along member = 7' 5" ft, in

Required flexural strength, M_x = 32.6 kip ft

Design flexural strength = 107.0 kip ft

Ratio = **0.305**



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4

Degree of shear connection = **0.262**

Absolute minimum degree of shear connection = **0.250**

Optimum amount of shear connection = **0.500**

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 372.3 in⁴

Long term inertia, I_{al} = 372.3 in⁴

Short term inertia @ partial interaction, I_{as} = 220.8 in⁴

Long term inertia @ partial interaction, I_{al} = 220.8 in⁴

Position Total load deflection = 7' 5" ft, in

Deflection with full shear connection n , δ = 0.241 in

Deflection of steel beam alone, δ_s = 0.520 in

Minimum degree of shear connection = 26.20 %

Deflection with partial shear connection, δ = 0.280 in

Span over limit = 0.742 in

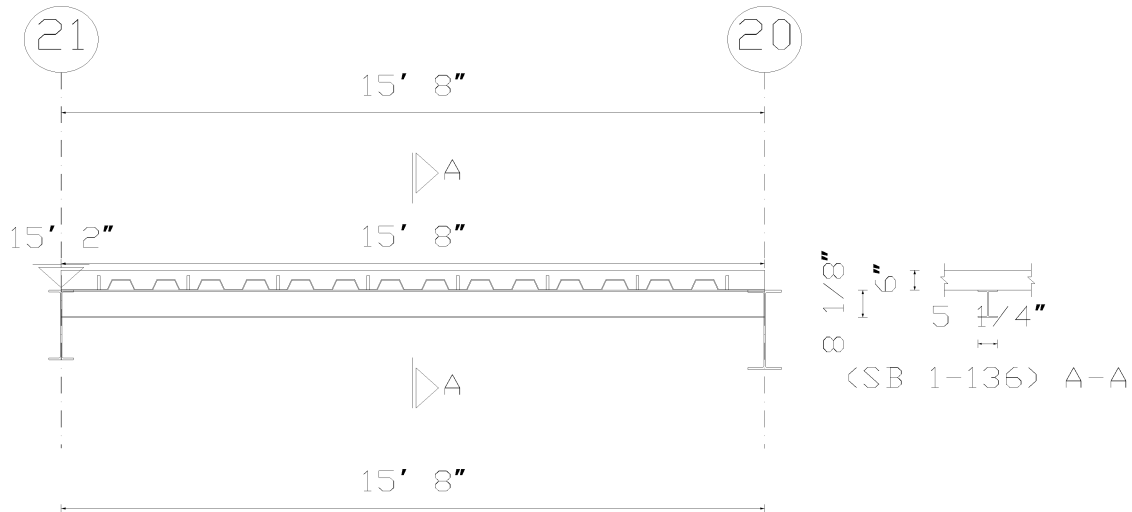
Design limit = 0.742 in

Utilization Ratio = **0.377**



Pass

SB 1-136



Second Level: SB 1-136 = 1
W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	15' 8"	•	1.000		1.000		1.000		1.000
support	15' 8"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	15' 8"	8	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 3' 11" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.418	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-10.3	56.2	kip	0.184	✓ Pass
Flexure	2	40.4	107.1	kip ft	0.377	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Connector Resistance	2	4	8		-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.014	-	in	-	-
Deflection Slab	2	0.229	0.783	in	0.292	✓ Pass
Deflection Dead	2	0.023	0.522	in	0.044	✓ Pass
Deflection Live	2	0.116	0.522	in	0.222	✓ Pass
Deflection Post Composite	2	0.139	0.522	in	0.267	✓ Pass
Deflection Total	2	0.382	0.783	in	0.488	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	4.0	56.2	kip	0.071	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	15.6	63.7	kip ft	0.245	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.014	-	in	-	-
Deflection Total	1	0.328	0.783	in	0.418	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 7' 10" - Critical

Moment, M_x = 15.6 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 4.0 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.071

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 10" - Critical

Dist of M_{rx} along member = 7' 10" ft, in

Required flexural strength, M_{rx1} = 15.6 kip ft



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Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3
Ratio =0.245



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =7' 10" ft, in

Max. Total load deflection =0.328 in

Span over limit =0.783 in

Design limit =0.783 in

Utilization Ratio =0.418



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 10" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w =29.900h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 15' 8" - Critical

Position of V_{ry} =15' 8" ft, inRequired major axis shear strength, V_{ry} =-10.3 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.184



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 10" Max Moment Position - Critical

Distance of M along member =7' 10" ft, in

Required flexural strength, M_x =40.4 kip ft

Design flexural strength =107.1 kip ft

Ratio =0.377



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 10" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4

Degree of shear connection =0.262

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 376.5 in⁴

Long term inertia, I_{aL} = 376.5 in⁴

Short term inertia @ partial interaction, I_{as} = 222.9 in⁴

Long term inertia @ partial interaction, I_{aL} = 222.9 in⁴

Position Total load deflection = 7' 10" ft, in

Deflection with full shear connection n , δ = 0.330 in

Deflection of steel beam alone, δ_s = 0.717 in

Minimum degree of shear connection = 26.20 %

Deflection with partial shear connection, δ = 0.382 in

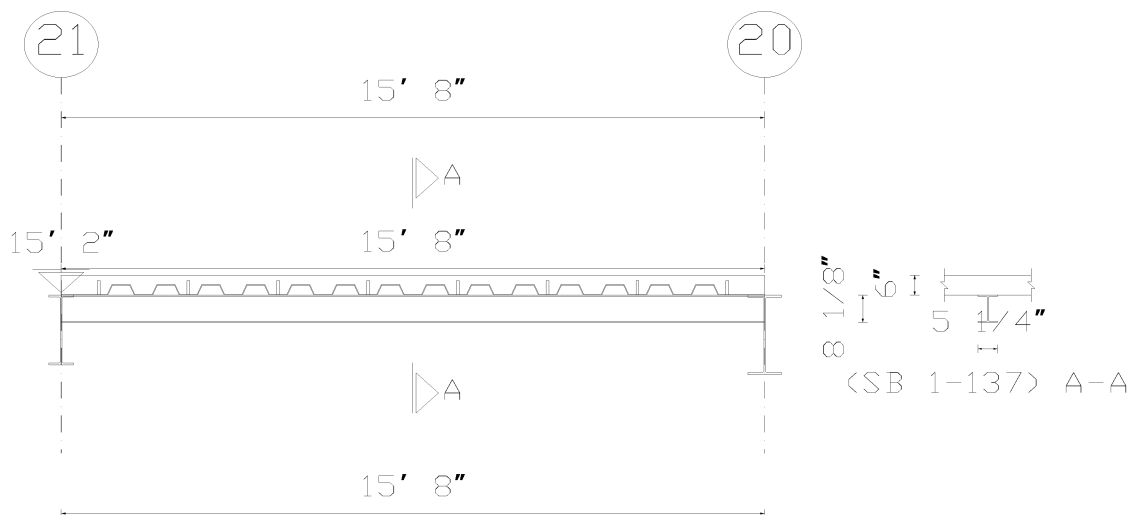
Span over limit = 0.783 in

Design limit = 0.783 in

Utilization Ratio = **0.488**

✓ Pass

SB 1-137



Second Level: SB 1-137 = 1
W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	15' 8"	•	1.000		1.000		1.000		1.000
support	15' 8"	•		•		•		•	

Connectors/Layout

Name	Diameter	As welded height	Specified ultimate tensile strength
AISC 3/4" x 4 3/8"	3/4"	4"	65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	15' 8"	8	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 3' 11" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.388	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	9.6	56.2	kip	0.170	✓ Pass
Flexure	2	37.4	107.1	kip ft	0.349	✓ Pass
Connector Resistance	2	4	8	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.014	-	in	-	-
Deflection Slab	2	0.212	0.783	in	0.270	✓ Pass
Deflection Dead	2	0.021	0.522	in	0.041	✓ Pass
Deflection Live	2	0.107	0.522	in	0.206	✓ Pass
Deflection Post Composite	2	0.129	0.522	in	0.247	✓ Pass
Deflection Total	2	0.354	0.783	in	0.453	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.7	56.2	kip	0.066	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	14.5	63.7	kip ft	0.227	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.014	-	in	-	-
Deflection Total	1	0.304	0.783	in	0.388	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 7' 10" - Critical



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Moment, M_x =14.5 kip ft
Elastic modulus of steel, E =29000 ksi
Minimum yield stress, F_y =50.00 ksi
Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =3.7 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.066



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 10" - Critical

Dist of M_{rx} along member =7' 10" ft, inRequired flexural strength, M_{rx1} =14.5 kip ft

Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3

Ratio =0.227



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =7' 10" ft, in

Max. Total load deflection =0.304 in

Span over limit =0.783 in

Design limit =0.783 in

Utilization Ratio =0.388



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 10" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w =29.900 h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =9.6 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.170



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 10" Max Moment Position - Critical

Distance of M along member = 7' 10" ft, in

Required flexural strength, M_x = 37.4 kip ft

Design flexural strength = 107.1 kip ft

Ratio = **0.349**



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 10" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4

Degree of shear connection = **0.262**

Absolute minimum degree of shear connection = **0.250**

Optimum amount of shear connection = **0.500**

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 376.5 in⁴

Long term inertia, I_{al} = 376.5 in⁴

Short term inertia @ partial interaction, I_{as} = 222.9 in⁴

Long term inertia @ partial interaction, I_{al} = 222.9 in⁴

Position Total load deflection = 7' 10" ft, in

Deflection with full shear connection n , δ = 0.306 in

Deflection of steel beam alone, δ_s = 0.664 in

Minimum degree of shear connection = 26.20 %

Deflection with partial shear connection, δ = 0.354 in

Span over limit = 0.783 in

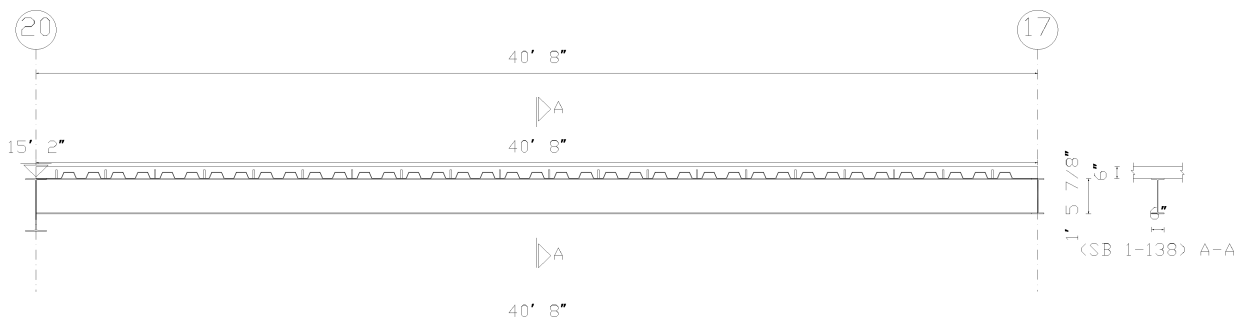
Design limit = 0.783 in

Utilization Ratio = **0.453**



Pass

SB 1-138



Second Level: SB 1-138 = 1 (W 18x40 A992-50 (20) [Deformed # 3 @ 8"])

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	40' 8"	•	1.000		1.000		1.000		1.000
support	40' 8"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	39' 4"	20	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 6 7/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 18x40 (20)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.696	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	24.6	169.2	kip	0.145	✓ Pass
Flexure	2	249.6	447.2	kip ft	0.558	✓ Pass
Connector Resistance	2	10	20		-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.141	-	in	-	-
Deflection Slab	2	0.930	2.033	in	0.457	✓ Pass
Deflection Dead	2	0.144	1.356	in	0.106	✓ Pass
Deflection Live	2	0.718	1.356	in	0.529	✓ Pass
Deflection Post Composite	2	0.861	1.356	in	0.635	✓ Pass
Deflection Total	2	1.932	2.033	in	0.950	✓ Pass

Construction Stage

W 18x40(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	9.8	169.2	kip	0.058	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	100.1	294.0	kip ft	0.341	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Self weight	1	0.141	-	in	-	-
Deflection Total	1	1.416	2.033	in	0.696	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Flexural: Position 15' 8" - Critical

Moment, M_x = 94.9 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 9.8 kip

Design shear strength = 169.2 kip AISC 360 G2

Ratio = 0.058



Pass

Flexure Major

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Yielding: 20' 4" - Critical

Dist of M_{rx} along member = 20' 4" ft, in

Required flexural strength, M_{rx1} = 100.1 kip ft

Design flexural strength = 294.0 kip ft AISC 360 F1, F2 and F3

Ratio = 0.341



Pass

Deflection

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 20' 4" ft, in

Max. Total load deflection = 1.416 in

Span over limit = 2.033 in

Design limit = 2.033 in

Utilization Ratio = 0.696



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

Position 20' 4" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w = 50.900

h / t_w limit for plastic stress distribution = 90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 24.6 kip

Design shear strength = 169.2 kip AISC 360 G2

Ratio = **0.145**

✓ Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

20' 4" Max Moment Position - Critical

Distance of M along member = 20' 4" ft, in

Required flexural strength, M_x = 249.6 kip ft

Design flexural strength = 447.2 kip ft

Ratio = **0.558**

✓ Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

20' 4" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 20

Number of shear connectors to critical point, N_a 10

Degree of shear connection = **0.308**

Absolute minimum degree of shear connection = **0.250**

Optimum amount of shear connection = **0.500**

Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 2008.0 in⁴

Long term inertia, I_{al} = 2008.0 in⁴

Short term inertia @ partial interaction, I_{as} = 1386.5 in⁴

Long term inertia @ partial interaction, I_{al} = 1386.5 in⁴

Position Total load deflection = 20' 4" ft, in

Deflection with full shear connection n , δ = 1.672 in

Deflection of steel beam alone, δ_s = 2.995 in

Minimum degree of shear connection = 30.78 %

Deflection with partial shear connection, δ = 1.932 in

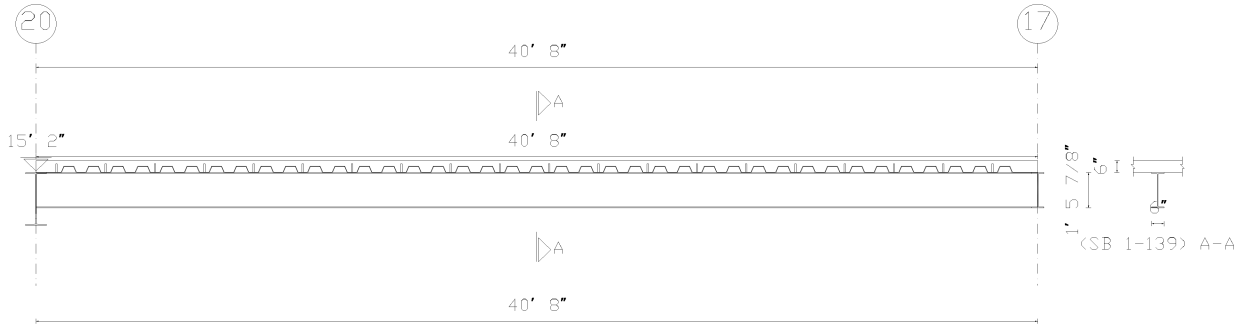
Span over limit = 2.033 in

Design limit = 2.033 in

Utilization Ratio = **0.950**

✓ Pass

SB 1-139



Second Level: SB 1-139 = 1 (W 18x40 A992-50 (20) [Deformed # 3 @ 8"])

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	40' 8"	•	1.000		1.000		1.000		1.000
support	40' 8"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	39' 4"	20	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 6 7/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 18x40 (20)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.696	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	24.6	169.2	kip	0.145	✓ Pass
Flexure	2	249.6	447.2	kip ft	0.558	✓ Pass
Connector Resistance	2	10	20		-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.141	-	in	-	-
Deflection Slab	2	0.930	2.033	in	0.457	✓ Pass
Deflection Dead	2	0.144	1.356	in	0.106	✓ Pass
Deflection Live	2	0.718	1.356	in	0.529	✓ Pass
Deflection Post Composite	2	0.861	1.356	in	0.635	✓ Pass
Deflection Total	2	1.932	2.033	in	0.950	✓ Pass



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Construction Stage

W 18x40(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	9.8	169.2	kip	0.058	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	100.1	294.0	kip ft	0.341	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.141	-	in	-	-
Deflection Total	1	1.416	2.033	in	0.696	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Flexural: Position 20' 4" - Critical

Moment, M_x = 100.1 kip ftElastic modulus of steel, E = 29000 ksiMinimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 9.8 kip

Design shear strength = 169.2 kip AISC 360 G2

Ratio = 0.058

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Yielding: 20' 4" - Critical

Dist of M_{rx} along member = 20' 4" ft, inRequired flexural strength, M_{rx1} = 100.1 kip ft

Design flexural strength = 294.0 kip ft AISC 360 F1, F2 and F3

Ratio = 0.341

✓ Pass

Deflection

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 20' 4" ft, in

Max. Total load deflection = 1.416 in

Span over limit = 2.033 in



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Design limit =2.033 in

Utilization Ratio =0.696



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

Position 20' 4" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w =50.900h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =24.6 kip

Design shear strength =169.2 kip AISC 360 G2

Ratio =0.145



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

20' 4" Max Moment Position - Critical

Distance of M along member =20' 4" ft, in

Required flexural strength, M_x =249.6 kip ft

Design flexural strength =447.2 kip ft

Ratio =0.558



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

20' 4" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 20

Number of shear connectors to critical point, N_a 10

Degree of shear connection =0.308

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

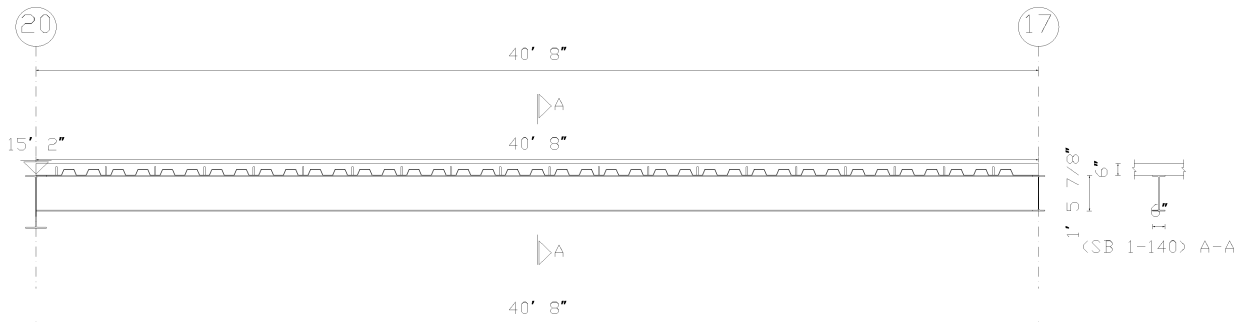
Deflection Total - Critical

Short term inertia, I_{as} =2008.0 in⁴Long term inertia, I_{al} =2008.0 in⁴Short term inertia @ partial interaction, I_{as} =1386.5 in⁴Long term inertia @ partial interaction, I_{al} =1386.5 in⁴

Position Total load deflection =20' 4" ft, in
Deflection with full shear connection n, δ =1.672 in
Deflection of steel beam alone, δ_s =2.995 in
Minimum degree of shear connection =30.78 %
Deflection with partial shear connection, δ =1.932 in
Span over limit =2.033 in
Design limit =2.033 in
Utilization Ratio =0.950

✓ Pass

SB 1-140



Second Level: SB 1-140 = 1 (W 18x40 A992-50 (20) [Deformed # 3 @ 8"])

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	40' 8"	•	1.000	•	1.000	•	1.000	•	1.000
support	40' 8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	39' 4"	20	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 6 7/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 18x40 (20)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.696	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	24.6	169.2	kip	0.145	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Flexure	2	249.6	447.2	kip ft	0.558	✓ Pass
Connector Resistance	2	10	20	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.141	-	in	-	-
Deflection Slab	2	0.930	2.033	in	0.457	✓ Pass
Deflection Dead	2	0.144	1.356	in	0.106	✓ Pass
Deflection Live	2	0.718	1.356	in	0.529	✓ Pass
Deflection Post Composite	2	0.861	1.356	in	0.635	✓ Pass
Deflection Total	2	1.932	2.033	in	0.950	✓ Pass

Construction Stage

W 18x40(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	9.8	169.2	kip	0.058	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	100.1	294.0	kip ft	0.341	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.141	-	in	-	-
Deflection Total	1	1.416	2.033	in	0.696	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Flexural: Position 20' 4" - Critical

Moment, M_x =100.1 kip ft

Elastic modulus of steel, E =29000 ksi

Minimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in

Required major axis shear strength, V_{ry} =9.8 kip

Design shear strength =169.2 kip AISC 360 G2

Ratio =0.058



Pass

Flexure Major

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Yielding: 20' 4" - Critical

Dist of M_{rx} along member =20' 4" ft, in

Required flexural strength, M_{rx1} =100.1 kip ft



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Design flexural strength =294.0 kip ft AISC 360 F1, F2 and F3
Ratio =0.341



Pass

Deflection

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =20' 4" ft, in

Max. Total load deflection =1.416 in

Span over limit =2.033 in

Design limit =2.033 in

Utilization Ratio =0.696



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

Position 20' 4" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w =50.900h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =24.6 kip

Design shear strength =169.2 kip AISC 360 G2

Ratio =0.145



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

20' 4" Max Moment Position - Critical

Distance of M along member =20' 4" ft, in

Required flexural strength, M_x =249.6 kip ft

Design flexural strength =447.2 kip ft

Ratio =0.558



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

20' 4" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 20

Number of shear connectors to critical point, N_a 10

Degree of shear connection =0.308

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 2008.0 in⁴

Long term inertia, I_{aL} = 2008.0 in⁴

Short term inertia @ partial interaction, I_{as} = 1386.5 in⁴

Long term inertia @ partial interaction, I_{aL} = 1386.5 in⁴

Position Total load deflection = 20' 4" ft, in

Deflection with full shear connection n, δ = 1.672 in

Deflection of steel beam alone, δ_s = 2.995 in

Minimum degree of shear connection = 30.78 %

Deflection with partial shear connection, δ = 1.932 in

Span over limit = 2.033 in

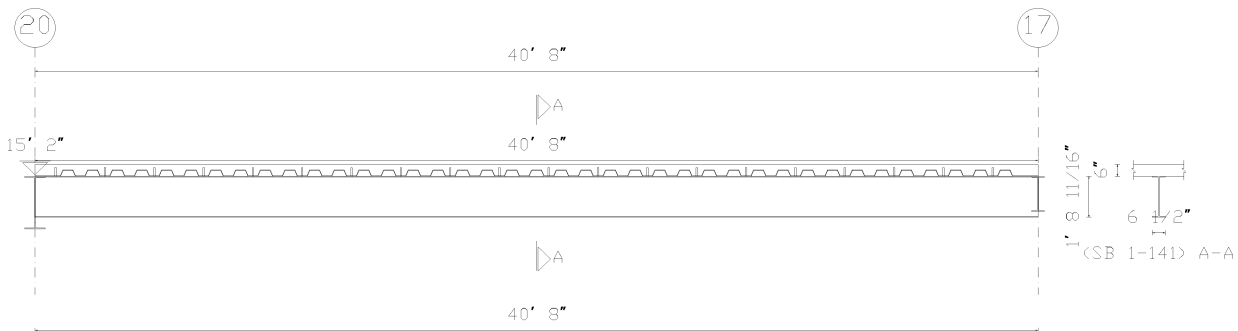
Design limit = 2.033 in

Utilization Ratio = **0.950**



Pass

SB 1-141



Second Level: SB 1-141 = 1 (W 21x44 A992-50 (20) [6x6 D12xD12])

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	40' 8"	•	1.000		1.000		1.000		1.000
support	40' 8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
 AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	39' 4"	20	1	2

Decking

Manufacturer Name Gauge Yield strength
 VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
 6" ft, in 4' 6 7/8" ft, in Normal 4.00 ksi



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Reinforcement

Transverse reinforcement

Type Area Yield strength
6x6 D12xD12 0.24 in²/ft 70.00 ksi

Reinforcement for crack control or fire requirements

Type Area Yield strength
6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 21x44 (20) C= 0.50

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.283	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-24.7	217.4	kip	0.113	✓ Pass
Flexure	2	250.7	532.6	kip ft	0.471	✓ Pass
Connector Resistance	2	10	20	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Slab	2	0.288	2.033	in	0.142	✓ Pass
Deflection Dead	2	0.108	1.356	in	0.080	✓ Pass
Deflection Live	2	0.540	1.356	in	0.398	✓ Pass
Deflection Post Composite	2	0.648	1.356	in	0.478	✓ Pass
Deflection Total	2	0.936	2.033	in	0.461	✓ Pass

Construction Stage

W 21x44(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	9.9	217.4	kip	0.046	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	101.2	357.7	kip ft	0.283	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Total	1	0.539	2.033	in	0.265	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Flexural: Position 20' 4" - Critical

Moment, M_x =101.2 kip ftElastic modulus of steel, E =29000 ksiMinimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =9.9 kip

Design shear strength =217.4 kip AISC 360 G2



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Ratio **=0.046**

Pass

Flexure Major

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Yielding: 20' 4" - Critical

Dist of M_{rx} along member =20' 4" ft, inRequired flexural strength, M_{rx1} =101.2 kip ft

Design flexural strength =357.7 kip ft AISC 360 F1, F2 and F3

Ratio **=0.283**

Pass

Deflection

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =20' 4" ft, in

Max. Total load deflection =1.039 in

Cambered Total load deflection =0.539 in

Span over limit =2.033 in

Design limit =2.033 in

Utilization Ratio **=0.265**

Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

Position 20' 4" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w **=53.600** h / t_w limit for plastic stress distribution **=90.553**

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

Position 40' 8" - Critical

Position of V_{ry} =40' 8" ft, inRequired major axis shear strength, V_{ry} =-24.7 kip

Design shear strength =217.4 kip AISC 360 G2

Ratio **=0.113**

Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

20' 4" Max Moment Position - Critical

Distance of M along member =20' 4" ft, in

Required flexural strength, M_x =250.7 kip ft

Design flexural strength =532.6 kip ft

Ratio **=0.471**

Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

20' 4" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 20

Number of shear connectors to critical point, N_a 10

Degree of shear connection = 0.308

Absolute minimum degree of shear connection = 0.250

Optimum amount of shear connection = 0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

Deflection Post Composite - Critical

Short term inertia, I_{as} = 2648.0 in⁴

Long term inertia, I_{al} = 2648.0 in⁴

Short term inertia @ partial interaction, I_{as} = 1844.4 in⁴

Long term inertia @ partial interaction, I_{al} = 1844.4 in⁴

Position Post Composite load deflection = 20' 4" ft, in

Deflection with full shear connection n , δ = 0.456 in

Deflection of steel beam alone, δ_s = 1.398 in

Minimum degree of shear connection = 30.78 %

Deflection with partial shear connection, δ = 0.648 in

Cambered Post Composite load deflection = 0.648 in

Span over limit = 1.356 in

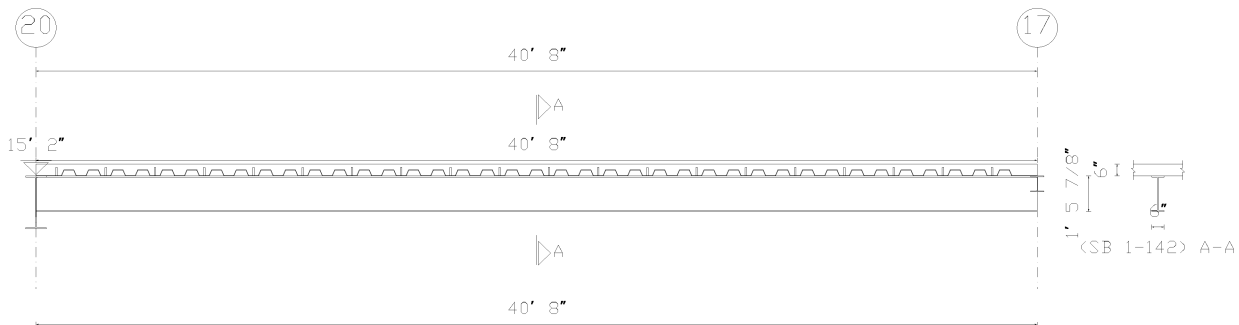
Design limit = 1.356 in

Utilization Ratio = 0.478



Pass

SB 1-142



Second Level: SB 1-142 = 1 (W 18x40 A992-50 (20) [Deformed # 3 @ 8"])

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	40' 8"	•	1.000	•	1.000		1.000		1.000
support	40' 8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength



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AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	39' 4"	20	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 6 7/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 18x40 (20)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.696	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	24.6	169.2	kip	0.145	✓ Pass
Flexure	2	249.6	447.2	kip ft	0.558	✓ Pass
Connector Resistance	2	10	20	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.141	-	in	-	-
Deflection Slab	2	0.930	2.033	in	0.457	✓ Pass
Deflection Dead	2	0.144	1.356	in	0.106	✓ Pass
Deflection Live	2	0.718	1.356	in	0.529	✓ Pass
Deflection Post Composite	2	0.861	1.356	in	0.635	✓ Pass
Deflection Total	2	1.932	2.033	in	0.950	✓ Pass

Construction Stage

W 18x40(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	9.8	169.2	kip	0.058	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	100.1	294.0	kip ft	0.341	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.141	-	in	-	-
Deflection Total	1	1.416	2.033	in	0.696	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical



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Flexural: Position 20' 4" - Critical

Moment, M_x =100.1 kip ftElastic modulus of steel, E =29000 ksiMinimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =9.8 kip

Design shear strength =169.2 kip AISC 360 G2

Ratio =0.058



Pass

Flexure Major

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Yielding: 20' 4" - Critical

Dist of M_{rx} along member =20' 4" ft, inRequired flexural strength, M_{rx1} =100.1 kip ft

Design flexural strength =294.0 kip ft AISC 360 F1, F2 and F3

Ratio =0.341



Pass

Deflection

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =20' 4" ft, in

Max. Total load deflection =1.416 in

Span over limit =2.033 in

Design limit =2.033 in

Utilization Ratio =0.696



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

Position 20' 4" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w =50.900 h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =24.6 kip

Design shear strength =169.2 kip AISC 360 G2

Ratio =0.145



Pass



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Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

20' 4" Max Moment Position - Critical

Distance of M along member =20' 4" ft, in

Required flexural strength, M_x =249.6 kip ft

Design flexural strength =447.2 kip ft

Ratio =**0.558**

Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

20' 4" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 20

Number of shear connectors to critical point, N_a 10Degree of shear connection =**0.308**Absolute minimum degree of shear connection =**0.250**Optimum amount of shear connection =**0.500**

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} =2008.0 in⁴Long term inertia, I_{aL} =2008.0 in⁴Short term inertia @ partial interaction, I_{as} =1386.5 in⁴Long term inertia @ partial interaction, I_{aL} =1386.5 in⁴

Position Total load deflection =20' 4" ft, in

Deflection with full shear connection n , δ =1.672 inDeflection of steel beam alone, δ_s =2.995 in

Minimum degree of shear connection =30.78 %

Deflection with partial shear connection, δ =1.932 in

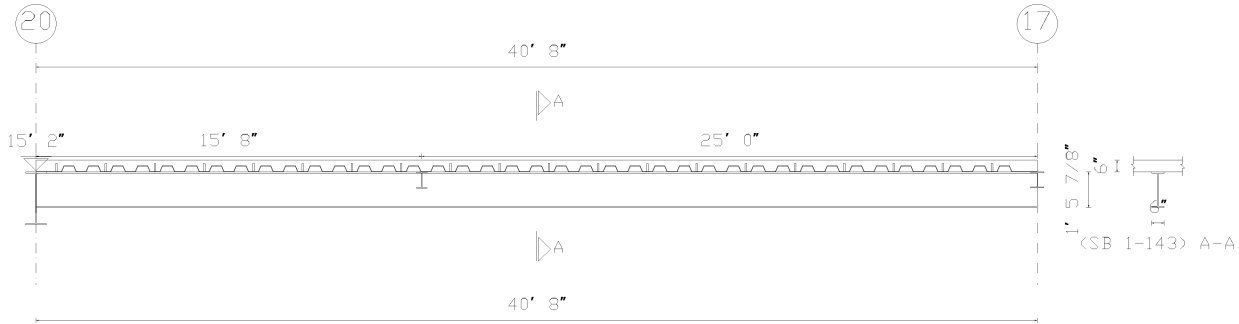
Span over limit =2.033 in

Design limit =2.033 in

Utilization Ratio =**0.950**

Pass

SB 1-143



Second Level: SB 1-143 = 1 (W 18x40 A992-50 (20) [Deformed # 3 @ 8"])

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	15' 8"	•	1.000		1.000		1.000		1.000
member	15' 8"	•						•	
sub-beam	25' 0"	•	1.000		1.000		1.000		1.000
support	40' 8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	39' 4"	20	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 6 7/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 18x40 (20)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.699	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	24.6	169.2	kip	0.145	✓ Pass
Flexure	2	250.0	447.2	kip ft	0.559	✓ Pass
Connector Resistance	2	8	20		-	⚠ Warning
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.146	-	in	-	-
Deflection Slab	2	0.930	2.033	in	0.457	✓ Pass
Deflection Dead	2	0.144	1.356	in	0.106	✓ Pass
Deflection Live	2	0.718	1.356	in	0.529	✓ Pass



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Post Composite	2	0.861	1.356	in	0.635	✓ Pass
Deflection Total	2	1.937	2.033	in	0.953	✓ Pass

Construction Stage

W 18x40(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	9.9	169.2	kip	0.058	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	100.5	294.0	kip ft	0.342	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.146	-	in	-	-
Deflection Total	1	1.421	2.033	in	0.699	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Flexural: Position 15' 8" - Critical

Moment, M_x = 95.3 kip ftElastic modulus of steel, E = 29000 ksiMinimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 9.9 kip

Design shear strength = 169.2 kip AISC 360 G2

Ratio = 0.058

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Yielding: 20' 3 1/2" - Critical

Dist of M_{rx} along member = 20' 3 1/2" ft, inRequired flexural strength, M_{rx1} = 100.5 kip ft

Design flexural strength = 294.0 kip ft AISC 360 F1, F2 and F3

Ratio = 0.342

✓ Pass

Deflection

1 Construction Stage

Span 1 W 18x40 A992-50 - Critical

Deflection Total - Critical



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Position Total load deflection =20' 3 7/8" ft, in
Max. Total load deflection =1.421 in
Span over limit =2.033 in
Design limit =2.033 in
Utilization Ratio =0.699



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

Position 20' 3 7/8" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w =50.900h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =24.6 kip

Design shear strength =169.2 kip AISC 360 G2

Ratio =0.145



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

20' 3 7/8" Max Moment Position - Critical

Distance of M along member =20' 3 7/8" ft, in

Required flexural strength, M_x =250.0 kip ft

Design flexural strength =447.2 kip ft

Ratio =0.559



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

15' 8" Max UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 20

Number of shear connectors to critical point, N_a 8

Degree of shear connection =0.246

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection



Warning

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x40 A992-50 - Critical

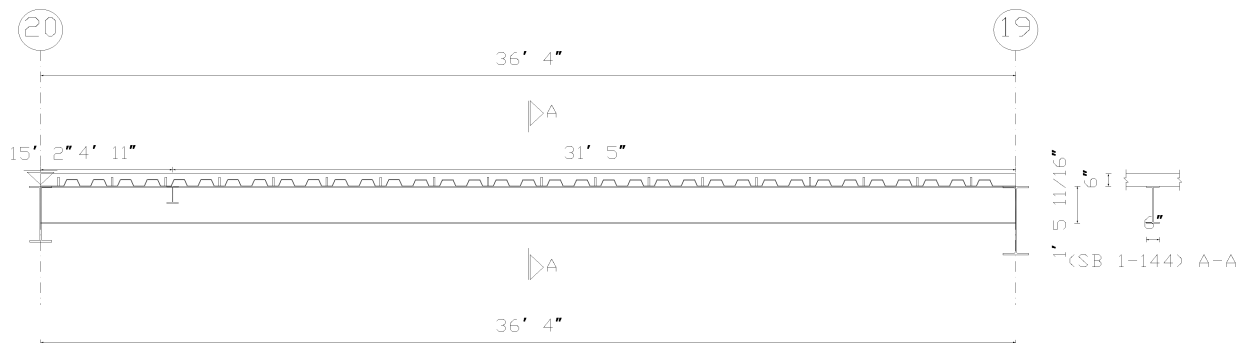
Deflection Total - Critical

Short term inertia, I_{as} =2008.0 in⁴

Long term inertia, I_{OL} = 2008.0 in⁴
Short term inertia @ partial interaction, I_{OS} = 1386.5 in⁴
Long term inertia @ partial interaction, I_{OL} = 1386.5 in⁴
Position Total load deflection = 20' 4" ft, in
Deflection with full shear connection n , δ = 1.677 in
Deflection of steel beam alone, δ_s = 3.000 in
Minimum degree of shear connection = 30.78 %
Deflection with partial shear connection, δ = 1.937 in
Span over limit = 2.033 in
Design limit = 2.033 in
Utilization Ratio = **0.953**

✓ Pass

SB 1-144



Second Level: SB 1-144 = 1
W 18x35 A992-50 (18) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 11"	•	1.000		1.000		1.000		1.000
member	4' 11"	•						•	
sub-beam	31' 5"	•	1.000		1.000		1.000		1.000
support	36' 4"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	35' 2"	18	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 6 7/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 18x35 (18)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.590	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	21.9	159.3	kip	0.137	✓ Pass
Flexure	2	198.4	387.6	kip ft	0.512	✓ Pass
Connector Resistance	2	9	18	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.096	-	in	-	-
Deflection Slab	2	0.712	1.817	in	0.392	✓ Pass
Deflection Dead	2	0.106	1.211	in	0.088	✓ Pass
Deflection Live	2	0.530	1.211	in	0.438	✓ Pass
Deflection Post Composite	2	0.636	1.211	in	0.525	✓ Pass
Deflection Total	2	1.444	1.817	in	0.795	✓ Pass

Construction Stage

W 18x35(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	8.7	159.3	kip	0.055	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	79.0	249.4	kip ft	0.317	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Deflection Self weight	1	0.096	-	in	-	-
Deflection Total	1	1.072	1.817	in	0.590	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Flexural: Position 4' 11" - Critical

Moment, M_x = 37.2 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 8.7 kip

Design shear strength = 159.3 kip AISC 360 G2

Ratio = 0.055

✓ Pass

Flexure Major



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1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Yielding: 18' 1 7/8" - Critical

Dist of M_{rx} along member = 18' 1 7/8" ft, in
Required flexural strength, M_{rx1} = 79.0 kip ft
Design flexural strength = 249.4 kip ft AISC 360 F1, F2 and F3
Ratio = **0.317**



Pass

Deflection

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 18' 2" ft, in
Max. Total load deflection = 1.072 in
Span over limit = 1.817 in
Design limit = 1.817 in
Utilization Ratio = **0.590**



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 18' 2" - Critical

Web class Compact AISC 360 Table B4.1b
 h / t_w = **53.500**
 h / t_w limit for plastic stress distribution = **90.553**

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in
Required major axis shear strength, V_{ry} = 21.9 kip
Design shear strength = 159.3 kip AISC 360 G2
Ratio = **0.137**



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2" Max Moment Position - Critical

Distance of M along member = 18' 2" ft, in
Required flexural strength, M_x = 198.4 kip ft
Design flexural strength = 387.6 kip ft
Ratio = **0.512**



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2" Max Moment and UR Position - Critical

Layout and strength of shear connectors
Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in
Number of shear connectors over full beam length 18
Number of shear connectors to critical point, N_a 9
Degree of shear connection =0.301
Absolute minimum degree of shear connection =0.250
Optimum amount of shear connection =0.500
Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

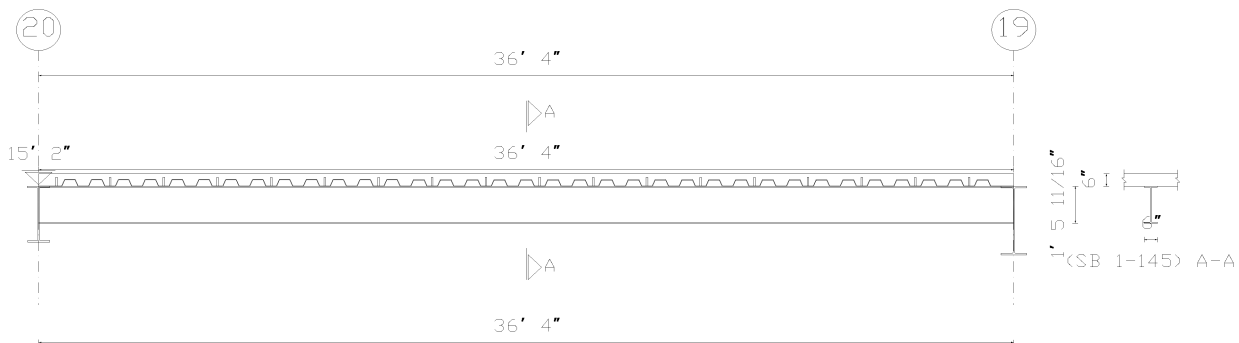
Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} =1768.6 in⁴
Long term inertia, I_{al} =1768.6 in⁴
Short term inertia @ partial interaction, I_{as} =1200.6 in⁴
Long term inertia @ partial interaction, I_{al} =1200.6 in⁴
Position Total load deflection =18' 2" ft, in
Deflection with full shear connection n, δ =1.246 in
Deflection of steel beam alone, δ_s =2.280 in
Minimum degree of shear connection =30.11 %
Deflection with partial shear connection, δ =1.444 in
Span over limit =1.817 in
Design limit =1.817 in
Utilization Ratio =0.795

✓ Pass

SB 1-145



Second Level: SB 1-145 = 1
W 18x35 A992-50 (18) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	36' 4"	•	1.000		1.000		1.000		1.000
support	36' 4"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	35' 2"	18	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 6 7/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 18x35 (18)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.589	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	21.8	159.3	kip	0.137	✓ Pass
Flexure	2	198.3	387.6	kip ft	0.512	✓ Pass
Connector Resistance	2	9	18	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.094	-	in	-	-
Deflection Slab	2	0.712	1.817	in	0.392	✓ Pass
Deflection Dead	2	0.106	1.211	in	0.088	✓ Pass
Deflection Live	2	0.530	1.211	in	0.438	✓ Pass
Deflection Post Composite	2	0.636	1.211	in	0.525	✓ Pass
Deflection Total	2	1.442	1.817	in	0.794	✓ Pass

Construction Stage

W 18x35(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	8.7	159.3	kip	0.055	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	78.9	249.4	kip ft	0.316	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.094	-	in	-	-
Deflection Total	1	1.070	1.817	in	0.589	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Flexural: Position 18' 2" - Critical



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Moment, M_x =78.9 kip ft
Elastic modulus of steel, E =29000 ksi
Minimum yield stress, F_y =50.00 ksi
Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =8.7 kip

Design shear strength =159.3 kip AISC 360 G2

Ratio =0.055



Pass

Flexure Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Yielding: 18' 2" - Critical

Dist of M_{rx} along member =18' 2" ft, inRequired flexural strength, M_{rx1} =78.9 kip ft

Design flexural strength =249.4 kip ft AISC 360 F1, F2 and F3

Ratio =0.316



Pass

Deflection

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =18' 2" ft, in

Max. Total load deflection =1.070 in

Span over limit =1.817 in

Design limit =1.817 in

Utilization Ratio =0.589



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 18' 2" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w =53.500 h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =21.8 kip

Design shear strength =159.3 kip AISC 360 G2

Ratio =0.137



Pass

Flexure



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2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2" Max Moment Position - Critical

Distance of M along member =18' 2" ft, in

Required flexural strength, M_x =198.3 kip ft

Design flexural strength =387.6 kip ft

Ratio =**0.512**

Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 18

Number of shear connectors to critical point, N_a 9Degree of shear connection =**0.301**Absolute minimum degree of shear connection =**0.250**Optimum amount of shear connection =**0.500**

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{aS} =1768.6 in⁴Long term inertia, I_{aL} =1768.6 in⁴Short term inertia @ partial interaction, I_{aS} =1200.6 in⁴Long term inertia @ partial interaction, I_{aL} =1200.6 in⁴

Position Total load deflection =18' 2" ft, in

Deflection with full shear connection n , δ =1.244 inDeflection of steel beam alone, δ_s =2.279 in

Minimum degree of shear connection =30.11 %

Deflection with partial shear connection, δ =1.442 in

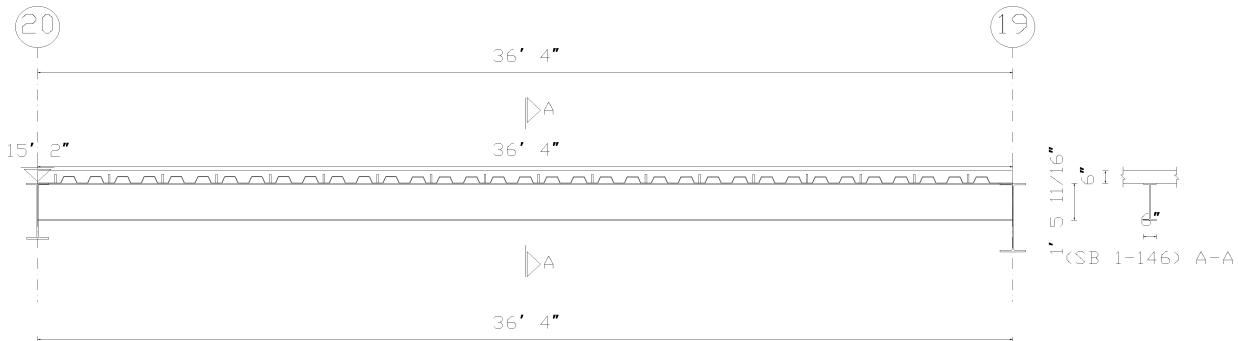
Span over limit =1.817 in

Design limit =1.817 in

Utilization Ratio =**0.794**

Pass

SB 1-146



Second Level: SB 1-146 = 1
W 18x35 A992-50 (18) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	36' 4"	•	1.000		1.000		1.000		1.000
support	36' 4"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	35' 2"	18	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 6 7/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 18x35 (18)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.589	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	21.8	159.3	kip	0.137	✓ Pass
Flexure	2	198.3	387.6	kip ft	0.512	✓ Pass
Connector Resistance	2	9	18	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.094	-	in	-	-
Deflection Slab	2	0.712	1.817	in	0.392	✓ Pass
Deflection Dead	2	0.106	1.211	in	0.088	✓ Pass
Deflection Live	2	0.530	1.211	in	0.438	✓ Pass



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Post Composite	2	0.636	1.211	in	0.525	✓ Pass
Deflection Total	2	1.442	1.817	in	0.794	✓ Pass

Construction Stage

W 18x35(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	8.7	159.3	kip	0.055	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	78.9	249.4	kip ft	0.316	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.094	-	in	-	-
Deflection Total	1	1.070	1.817	in	0.589	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Flexural: Position 18' 2" - Critical

Moment, M_x = 78.9 kip ftElastic modulus of steel, E = 29000 ksiMinimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 8.7 kip

Design shear strength = 159.3 kip AISC 360 G2

Ratio = 0.055

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Yielding: 18' 2" - Critical

Dist of M_{rx} along member = 18' 2" ft, inRequired flexural strength, M_{rx1} = 78.9 kip ft

Design flexural strength = 249.4 kip ft AISC 360 F1, F2 and F3

Ratio = 0.316

✓ Pass

Deflection

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical



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Position Total load deflection =18' 2" ft, in
Max. Total load deflection =1.070 in
Span over limit =1.817 in
Design limit =1.817 in
Utilization Ratio =0.589



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 18' 2" - Critical

Web class Compact AISC 360 Table B4.1b
h / t_w =53.500
h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in
Required major axis shear strength, V_{ry} =21.8 kip
Design shear strength =159.3 kip AISC 360 G2
Ratio =0.137



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2" Max Moment Position - Critical

Distance of M along member =18' 2" ft, in
Required flexural strength, M_x =198.3 kip ft
Design flexural strength =387.6 kip ft
Ratio =0.512



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2" Max Moment and UR Position - Critical

Layout and strength of shear connectors
Maximum group spacing, s =2' 0" ft, in
Maximum permitted group spacing =3' 0" ft, in
Number of shear connectors over full beam length 18
Number of shear connectors to critical point, N_a 9
Degree of shear connection =0.301
Absolute minimum degree of shear connection =0.250
Optimum amount of shear connection =0.500
Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

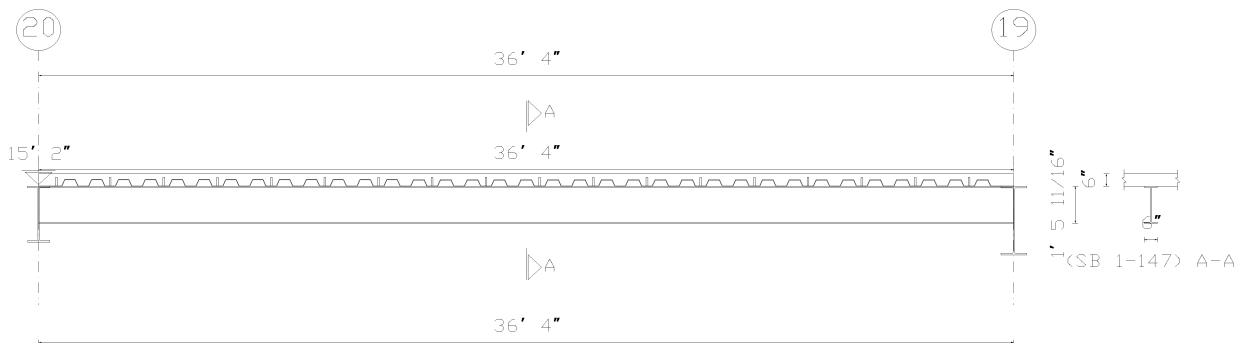
Deflection Total - Critical

Short term inertia, I_{as} =1768.6 in⁴

Long term inertia, $I_{\alpha L}$ =1768.6 in⁴
Short term inertia @ partial interaction, $I_{\alpha S}$ =1200.6 in⁴
Long term inertia @ partial interaction, $I_{\alpha L}$ =1200.6 in⁴
Position Total load deflection =18' 2" ft, in
Deflection with full shear connection n , δ =1.244 in
Deflection of steel beam alone, δ_s =2.279 in
Minimum degree of shear connection =30.11 %
Deflection with partial shear connection, δ =1.442 in
Span over limit =1.817 in
Design limit =1.817 in
Utilization Ratio =0.794

✓ Pass

SB 1-147



Second Level: SB 1-147 = 1
W 18x35 A992-50 (18) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	36' 4"	•	1.000		1.000		1.000		1.000
support	36' 4"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	35' 2"	18	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 6 7/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 18x35 (18)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.589	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	21.8	159.3	kip	0.137	✓ Pass
Flexure	2	198.3	387.6	kip ft	0.512	✓ Pass
Connector Resistance	2	9	18	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.094	-	in	-	-
Deflection Slab	2	0.712	1.817	in	0.392	✓ Pass
Deflection Dead	2	0.106	1.211	in	0.088	✓ Pass
Deflection Live	2	0.530	1.211	in	0.438	✓ Pass
Deflection Post Composite	2	0.636	1.211	in	0.525	✓ Pass
Deflection Total	2	1.442	1.817	in	0.794	✓ Pass

Construction Stage

W 18x35(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	8.7	159.3	kip	0.055	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	78.9	249.4	kip ft	0.316	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.094	-	in	-	-
Deflection Total	1	1.070	1.817	in	0.589	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Flexural: Position 18' 2" - Critical

Moment, M_x =78.9 kip ft

Elastic modulus of steel, E =29000 ksi

Minimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in

Required major axis shear strength, V_{ry} =8.7 kip

Design shear strength =159.3 kip AISC 360 G2

Ratio =0.055

✓ Pass

Flexure Major

1 Construction Stage



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Span 1 W 18x35 A992-50 - Critical

Yielding: 18' 2" - Critical

Dist of M_{rx} along member = 18' 2" ft, inRequired flexural strength, M_{rx1} = 78.9 kip ft

Design flexural strength = 249.4 kip ft AISC 360 F1, F2 and F3

Ratio = **0.316**

Pass

Deflection

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 18' 2" ft, in

Max. Total load deflection = 1.070 in

Span over limit = 1.817 in

Design limit = 1.817 in

Utilization Ratio = **0.589**

Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 18' 2" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w = **53.500** h / t_w limit for plastic stress distribution = **90.553**

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 21.8 kip

Design shear strength = 159.3 kip AISC 360 G2

Ratio = **0.137**

Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2" Max Moment Position - Critical

Distance of M along member = 18' 2" ft, in

Required flexural strength, M_x = 198.3 kip ft

Design flexural strength = 387.6 kip ft

Ratio = **0.512**

Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 18

Number of shear connectors to critical point, N_a 9
Degree of shear connection =0.301
Absolute minimum degree of shear connection =0.250
Optimum amount of shear connection =0.500
Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

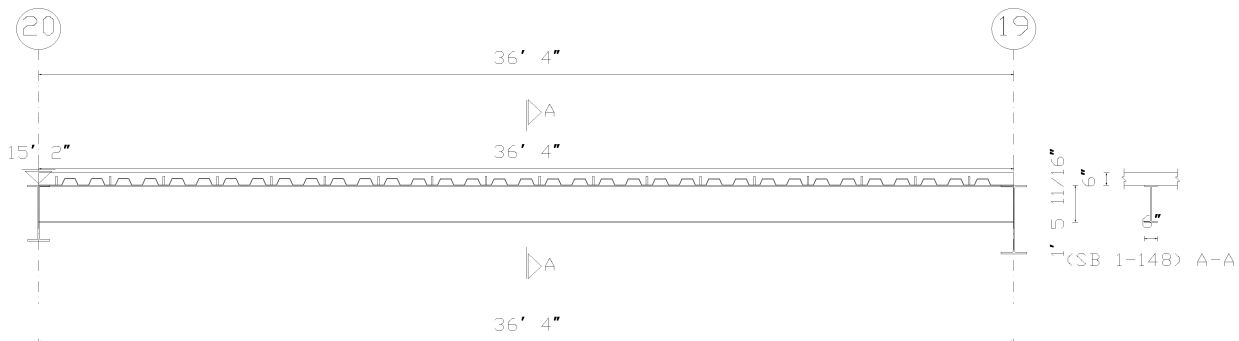
Deflection Total - Critical

Short term inertia, I_{as} =1768.6 in⁴
Long term inertia, I_{al} =1768.6 in⁴
Short term inertia @ partial interaction, I_{as} =1200.6 in⁴
Long term inertia @ partial interaction, I_{al} =1200.6 in⁴
Position Total load deflection =18' 2" ft, in
Deflection with full shear connection n, δ =1.244 in
Deflection of steel beam alone, δ_s =2.279 in
Minimum degree of shear connection =30.11 %
Deflection with partial shear connection, δ =1.442 in
Span over limit =1.817 in
Design limit =1.817 in
Utilization Ratio =0.794



Pass

SB 1-148



Second Level: SB 1-148 = 1
W 18x35 A992-50 (18) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	36' 4"	•	1.000		1.000		1.000		1.000
support	36' 4"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	35' 2"	18	1	2

Decking



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Manufacturer Name Gauge Yield strength
 VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
 6" ft, in 4' 6 7/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
 Type Area Yield strength Type Area Yield strength
 Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 18x35 (18)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.589	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	21.8	159.3	kip	0.137	✓ Pass
Flexure	2	198.3	387.6	kip ft	0.512	✓ Pass
Connector Resistance	2	9	18	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.094	-	in	-	-
Deflection Slab	2	0.712	1.817	in	0.392	✓ Pass
Deflection Dead	2	0.106	1.211	in	0.088	✓ Pass
Deflection Live	2	0.530	1.211	in	0.438	✓ Pass
Deflection Post Composite	2	0.636	1.211	in	0.525	✓ Pass
Deflection Total	2	1.442	1.817	in	0.794	✓ Pass

Construction Stage

W 18x35(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	8.7	159.3	kip	0.055	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	78.9	249.4	kip ft	0.316	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.094	-	in	-	-
Deflection Total	1	1.070	1.817	in	0.589	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Flexural: Position 18' 2" - Critical

Moment, M_x = 78.9 kip ftElastic modulus of steel, E = 29000 ksiMinimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major



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1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 8.7 kip

Design shear strength = 159.3 kip AISC 360 G2

Ratio = 0.055



Pass

Flexure Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Yielding: 18' 2" - Critical

Dist of M_{rx} along member = 18' 2" ft, inRequired flexural strength, M_{rx1} = 78.9 kip ft

Design flexural strength = 249.4 kip ft AISC 360 F1, F2 and F3

Ratio = 0.316



Pass

Deflection

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 18' 2" ft, in

Max. Total load deflection = 1.070 in

Span over limit = 1.817 in

Design limit = 1.817 in

Utilization Ratio = 0.589



Pass

Classification

2 LRF_{D2}-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 18' 2" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w = 53.500 h / t_w limit for plastic stress distribution = 90.553

Vertical Shear

2 LRF_{D2}-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 21.8 kip

Design shear strength = 159.3 kip AISC 360 G2

Ratio = 0.137



Pass

Flexure

2 LRF_{D2}-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2" Max Moment Position - Critical

Distance of M along member = 18' 2" ft, in

Required flexural strength, M_x = 198.3 kip ft

Design flexural strength =387.6 kip ft

Ratio =0.512



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 18

Number of shear connectors to critical point, N_a 9

Degree of shear connection =0.301

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} =1768.6 in⁴

Long term inertia, I_{atL} =1768.6 in⁴

Short term inertia @ partial interaction, I_{as} =1200.6 in⁴

Long term inertia @ partial interaction, I_{atL} =1200.6 in⁴

Position Total load deflection =18' 2" ft, in

Deflection with full shear connection n, δ =1.244 in

Deflection of steel beam alone, δ_s =2.279 in

Minimum degree of shear connection =30.11 %

Deflection with partial shear connection, δ =1.442 in

Span over limit =1.817 in

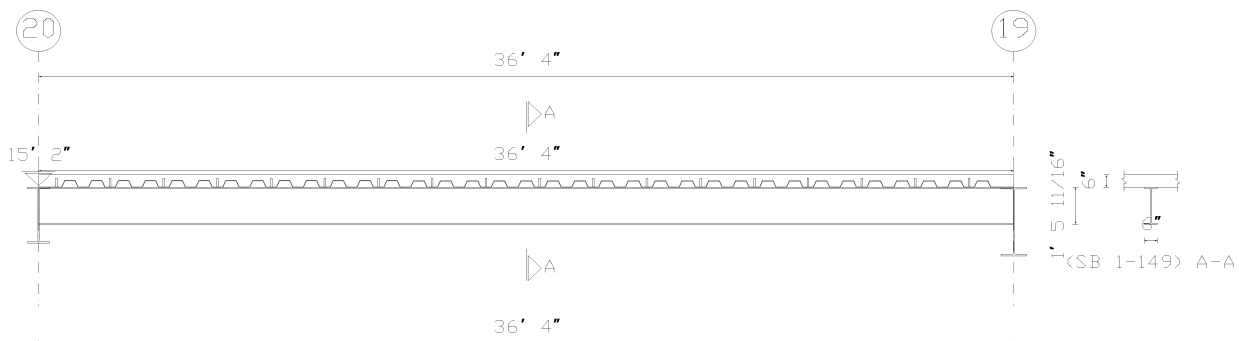
Design limit =1.817 in

Utilization Ratio =0.794



Pass

SB 1-149



Second Level: SB 1-149 = 1
 W 18x35 A992-50 (18) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	36' 4"	•	1.000		1.000		1.000		1.000
support	36' 4"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength

AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	35' 2"	18	1	2

Decking

Manufacturer Name Gauge Yield strength

VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'

6" ft, in 4' 6 7/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements

Type Area Yield strength Type Area Yield strength

Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 18x35 (18)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.589	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	21.8	159.3	kip	0.137	✓ Pass
Flexure	2	198.3	387.6	kip ft	0.512	✓ Pass
Connector Resistance	2	9	18	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.094	-	in	-	-
Deflection Slab	2	0.712	1.817	in	0.392	✓ Pass
Deflection Dead	2	0.106	1.211	in	0.088	✓ Pass
Deflection Live	2	0.530	1.211	in	0.438	✓ Pass
Deflection Post Composite	2	0.636	1.211	in	0.525	✓ Pass
Deflection Total	2	1.442	1.817	in	0.794	✓ Pass

Construction Stage

W 18x35(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	8.7	159.3	kip	0.055	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	78.9	249.4	kip ft	0.316	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.094	-	in	-	-



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Total	1	1.070	1.817	in	0.589	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Flexural: Position 18' 2" - Critical

Moment, M_x = 78.9 kip ftElastic modulus of steel, E = 29000 ksiMinimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 8.7 kip

Design shear strength = 159.3 kip AISC 360 G2

Ratio = 0.055

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Yielding: 18' 2" - Critical

Dist of M_{rx} along member = 18' 2" ft, inRequired flexural strength, M_{rx1} = 78.9 kip ft

Design flexural strength = 249.4 kip ft AISC 360 F1, F2 and F3

Ratio = 0.316

✓ Pass

Deflection

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 18' 2" ft, in

Max. Total load deflection = 1.070 in

Span over limit = 1.817 in

Design limit = 1.817 in

Utilization Ratio = 0.589

✓ Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 18' 2" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w = 53.500 h / t_w limit for plastic stress distribution = 90.553

Vertical Shear



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2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 0" - Critical

Position of V_y = 0" ft, inRequired major axis shear strength, V_y = 21.8 kip

Design shear strength = 159.3 kip AISC 360 G2

Ratio = 0.137



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2" Max Moment Position - Critical

Distance of M along member = 18' 2" ft, in

Required flexural strength, M_x = 198.3 kip ft

Design flexural strength = 387.6 kip ft

Ratio = 0.512



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 18

Number of shear connectors to critical point, N_a 9

Degree of shear connection = 0.301

Absolute minimum degree of shear connection = 0.250

Optimum amount of shear connection = 0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 1768.6 in⁴Long term inertia, I_{aL} = 1768.6 in⁴Short term inertia @ partial interaction, I_{as} = 1200.6 in⁴Long term inertia @ partial interaction, I_{aL} = 1200.6 in⁴

Position Total load deflection = 18' 2" ft, in

Deflection with full shear connection n , δ = 1.244 inDeflection of steel beam alone, δ_s = 2.279 in

Minimum degree of shear connection = 30.11 %

Deflection with partial shear connection, δ = 1.442 in

Span over limit = 1.817 in

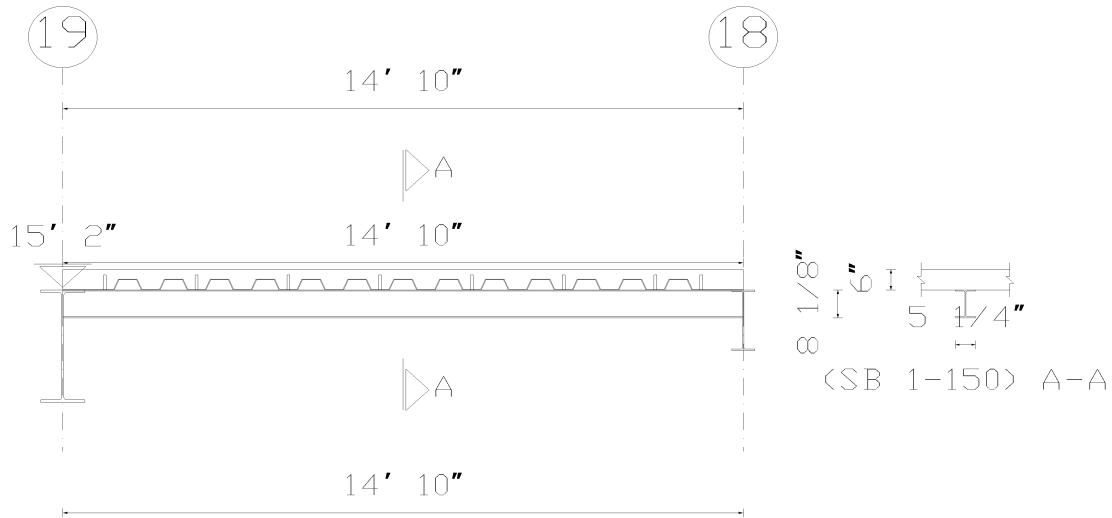
Design limit = 1.817 in

Utilization Ratio = 0.794



Pass

SB 1-150



Second Level: SB 1-150 = 1
W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	14' 10"	•	1.000		1.000		1.000		1.000
support	14' 10"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	11' 5"	6	1	2
12' 5"	14' 10"	2	1	1

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f'_c
6" ft, in 3' 8 5/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.320	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	8.8	56.2	kip	0.156	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Flexure	2	32.5	107.0	kip ft	0.303	✓ Pass
Connector Resistance	2	4	8	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.011	-	in	-	-
Deflection Slab	2	0.165	0.742	in	0.223	✓ Pass
Deflection Dead	2	0.017	0.494	in	0.034	✓ Pass
Deflection Live	2	0.085	0.494	in	0.172	✓ Pass
Deflection Post Composite	2	0.102	0.494	in	0.206	✓ Pass
Deflection Total	2	0.278	0.742	in	0.375	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.4	56.2	kip	0.060	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	12.6	63.7	kip ft	0.197	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.011	-	in	-	-
Deflection Total	1	0.237	0.742	in	0.320	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 7' 5" - Critical

Moment, M_x = 12.6 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 3.4 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.060

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 5" - Critical

Dist of M_{rx} along member = 7' 5" ft, in

Required flexural strength, M_{rx1} = 12.6 kip ft



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Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3
Ratio =0.197



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =7' 5" ft, in

Max. Total load deflection =0.237 in

Span over limit =0.742 in

Design limit =0.742 in

Utilization Ratio =0.320



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 5" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w =29.900h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =8.8 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.156



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment Position - Critical

Distance of M along member =7' 5" ft, in

Required flexural strength, M_x =32.5 kip ft

Design flexural strength =107.0 kip ft

Ratio =0.303



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4

Degree of shear connection =0.262

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 372.3 in⁴

Long term inertia, I_{aL} = 372.3 in⁴

Short term inertia @ partial interaction, I_{as} = 220.8 in⁴

Long term inertia @ partial interaction, I_{aL} = 220.8 in⁴

Position Total load deflection = 7' 5" ft, in

Deflection with full shear connection n , δ = 0.240 in

Deflection of steel beam alone, δ_s = 0.518 in

Minimum degree of shear connection = 26.20 %

Deflection with partial shear connection, δ = 0.278 in

Span over limit = 0.742 in

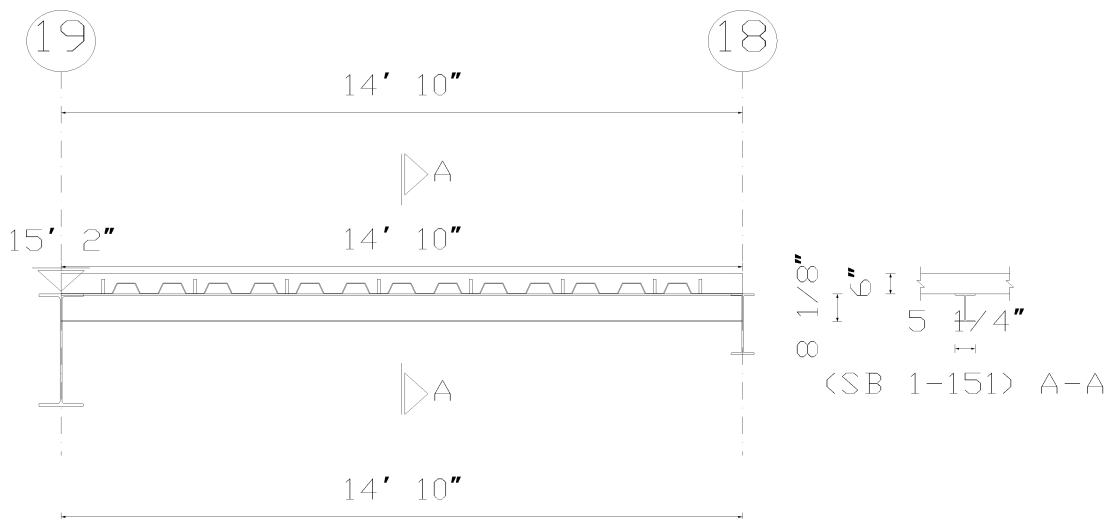
Design limit = 0.742 in

Utilization Ratio = 0.375



Pass

SB 1-151



Second Level: SB 1-151 - 1
W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	14' 10"	•	1.000		1.000		1.000		1.000
support	14' 10"	•		•		•		•	

Connectors/Layout

Name	Diameter	As welded height	Specified ultimate tensile strength
AISC 3/4" x 4 3/8"	3/4"	4"	65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	11' 5"	6	1	2
12' 5"	14' 10"	2	1	1

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 3' 8 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.320	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-8.8	56.2	kip	0.156	✓ Pass
Flexure	2	32.5	107.0	kip ft	0.303	✓ Pass
Connector Resistance	2	4	8	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.011	-	in	-	-
Deflection Slab	2	0.165	0.742	in	0.223	✓ Pass
Deflection Dead	2	0.017	0.494	in	0.034	✓ Pass
Deflection Live	2	0.085	0.494	in	0.172	✓ Pass
Deflection Post Composite	2	0.102	0.494	in	0.206	✓ Pass
Deflection Total	2	0.278	0.742	in	0.375	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.4	56.2	kip	0.060	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	12.6	63.7	kip ft	0.197	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.011	-	in	-	-
Deflection Total	1	0.237	0.742	in	0.320	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical



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Flexural: Position 7' 5" - Critical

Moment, M_x =12.6 kip ft
Elastic modulus of steel, E =29000 ksi
Minimum yield stress, F_y =50.00 ksi
Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in
Required major axis shear strength, V_{ry} =3.4 kip
Design shear strength =56.2 kip AISC 360 G2
Ratio =0.060



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 5" - Critical

Dist of M_{rx} along member =7' 5" ft, in
Required flexural strength, M_{rx1} =12.6 kip ft
Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3
Ratio =0.197



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =7' 5" ft, in
Max. Total load deflection =0.237 in
Span over limit =0.742 in
Design limit =0.742 in
Utilization Ratio =0.320



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 5" - Critical

Web class Compact AISC 360 Table B4.1b
 h / t_w =29.900
 h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 14' 10" - Critical

Position of V_{ry} =14' 10" ft, in
Required major axis shear strength, V_{ry} =8.8 kip
Design shear strength =56.2 kip AISC 360 G2
Ratio =0.156



Pass



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Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment Position - Critical

Distance of M along member = 7' 5" ft, in

Required flexural strength, M_x = 32.5 kip ft

Design flexural strength = 107.0 kip ft

Ratio = **0.303**

Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4Degree of shear connection = **0.262**Absolute minimum degree of shear connection = **0.250**Optimum amount of shear connection = **0.500**

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 372.0 in⁴Long term inertia, I_{aL} = 372.0 in⁴Short term inertia @ partial interaction, I_{as} = 220.7 in⁴Long term inertia @ partial interaction, I_{aL} = 220.7 in⁴

Position Total load deflection = 7' 5" ft, in

Deflection with full shear connection n , δ = 0.240 inDeflection of steel beam alone, δ_s = 0.518 in

Minimum degree of shear connection = 26.20 %

Deflection with partial shear connection, δ = 0.278 in

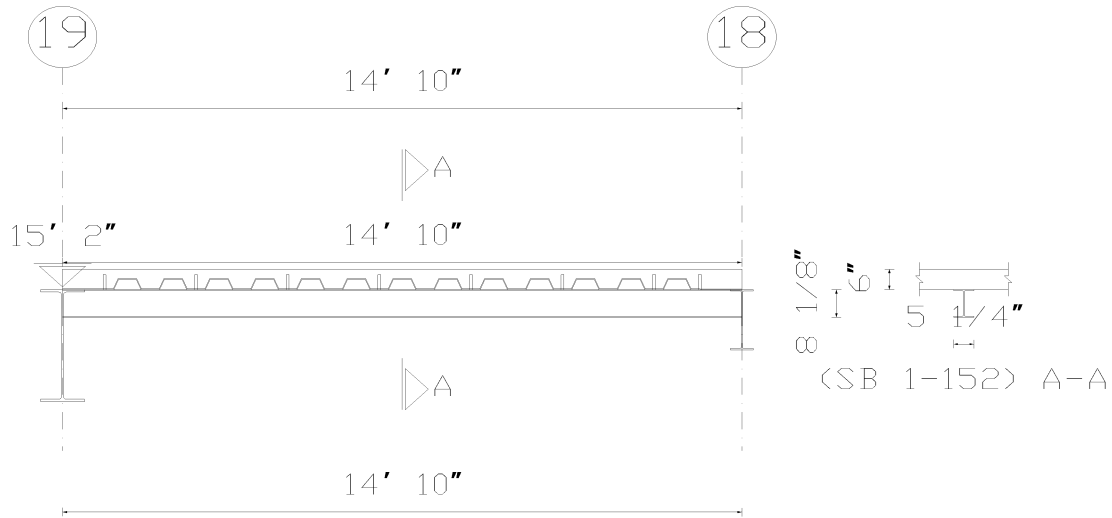
Span over limit = 0.742 in

Design limit = 0.742 in

Utilization Ratio = **0.375**

Pass

SB 1-152



Second Level: SB 1-152 = 1
W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	14' 10"	•	1.000		1.000		1.000		1.000
support	14' 10"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	11' 5"	6	1	2
12' 5"	14' 10"	2	1	1

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 3' 8 5/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.320	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-8.8	56.2	kip	0.156	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Flexure	2	32.5	107.0	kip ft	0.303	✓ Pass
Connector Resistance	2	4	8	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.011	-	in	-	-
Deflection Slab	2	0.165	0.742	in	0.223	✓ Pass
Deflection Dead	2	0.017	0.494	in	0.034	✓ Pass
Deflection Live	2	0.085	0.494	in	0.172	✓ Pass
Deflection Post Composite	2	0.102	0.494	in	0.206	✓ Pass
Deflection Total	2	0.278	0.742	in	0.375	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.4	56.2	kip	0.060	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	12.6	63.7	kip ft	0.197	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.011	-	in	-	-
Deflection Total	1	0.237	0.742	in	0.320	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 7' 5" - Critical

Moment, M_x = 12.6 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 3.4 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.060

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 5" - Critical

Dist of M_{rx} along member = 7' 5" ft, in

Required flexural strength, M_{rx1} = 12.6 kip ft



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Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3
Ratio =0.197



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =7' 5" ft, in

Max. Total load deflection =0.237 in

Span over limit =0.742 in

Design limit =0.742 in

Utilization Ratio =0.320



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 5" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w =29.900h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 14' 10" - Critical

Position of V_{ry} =14' 10" ft, inRequired major axis shear strength, V_{ry} =8.8 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.156



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment Position - Critical

Distance of M along member =7' 5" ft, in

Required flexural strength, M_x =32.5 kip ft

Design flexural strength =107.0 kip ft

Ratio =0.303



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4

Degree of shear connection =0.262

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 372.3 in⁴

Long term inertia, I_{aL} = 372.3 in⁴

Short term inertia @ partial interaction, I_{as} = 220.8 in⁴

Long term inertia @ partial interaction, I_{aL} = 220.8 in⁴

Position Total load deflection = 7' 5" ft, in

Deflection with full shear connection n , δ = 0.240 in

Deflection of steel beam alone, δ_s = 0.518 in

Minimum degree of shear connection = 26.20 %

Deflection with partial shear connection, δ = 0.278 in

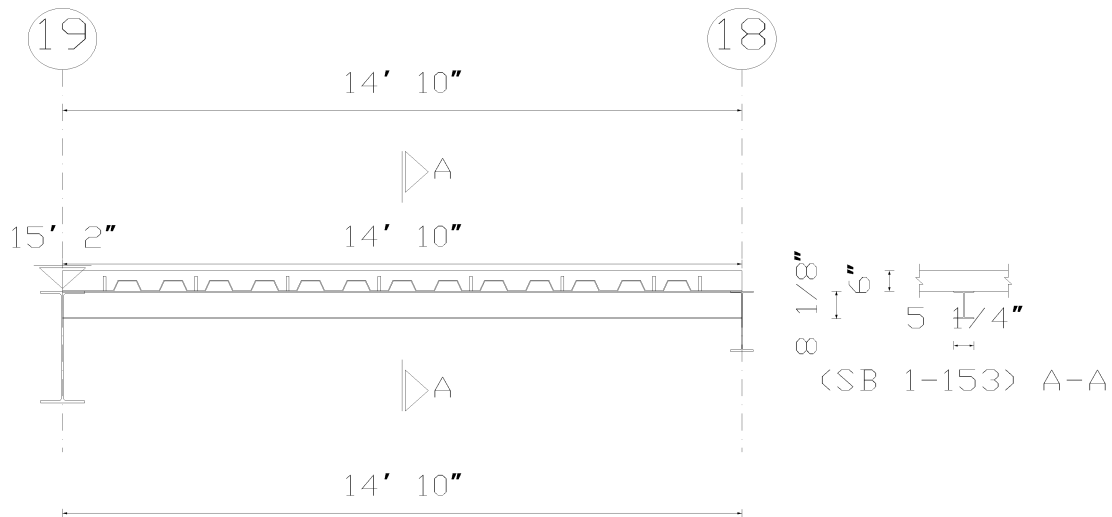
Span over limit = 0.742 in

Design limit = 0.742 in

Utilization Ratio = 0.375

✓ Pass

SB 1-153



Second Level: SB 1-153 - 1
 W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	14' 10"	•	1.000		1.000		1.000		1.000
support	14' 10"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
 AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	11' 5"	6	1	2
12' 5"	14' 10"	2	1	1

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 3' 8 5/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.320	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	8.8	56.2	kip	0.156	✓ Pass
Flexure	2	32.5	107.0	kip ft	0.303	✓ Pass
Connector Resistance	2	4	8	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.011	-	in	-	-
Deflection Slab	2	0.165	0.742	in	0.223	✓ Pass
Deflection Dead	2	0.017	0.494	in	0.034	✓ Pass
Deflection Live	2	0.085	0.494	in	0.172	✓ Pass
Deflection Post Composite	2	0.102	0.494	in	0.206	✓ Pass
Deflection Total	2	0.278	0.742	in	0.375	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.4	56.2	kip	0.060	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	12.6	63.7	kip ft	0.197	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.011	-	in	-	-
Deflection Total	1	0.237	0.742	in	0.320	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical



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Flexural: Position 7' 5" - Critical

Moment, M_x =12.6 kip ft
Elastic modulus of steel, E =29000 ksi
Minimum yield stress, F_y =50.00 ksi
Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in
Required major axis shear strength, V_{ry} =3.4 kip
Design shear strength =56.2 kip AISC 360 G2
Ratio =0.060



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 5" - Critical

Dist of M_{rx} along member =7' 5" ft, in
Required flexural strength, M_{rx1} =12.6 kip ft
Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3
Ratio =0.197



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =7' 5" ft, in
Max. Total load deflection =0.237 in
Span over limit =0.742 in
Design limit =0.742 in
Utilization Ratio =0.320



Pass

Classification

2 LRF2-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 5" - Critical

Web class Compact AISC 360 Table B4.1b
 h / t_w =29.900
 h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRF2-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in
Required major axis shear strength, V_{ry} =8.8 kip
Design shear strength =56.2 kip AISC 360 G2
Ratio =0.156



Pass



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Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment Position - Critical

Distance of M along member = 7' 5" ft, in

Required flexural strength, M_x = 32.5 kip ft

Design flexural strength = 107.0 kip ft

Ratio = **0.303**

Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4Degree of shear connection = **0.262**Absolute minimum degree of shear connection = **0.250**Optimum amount of shear connection = **0.500**

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 372.3 in⁴Long term inertia, I_{aL} = 372.3 in⁴Short term inertia @ partial interaction, I_{as} = 220.8 in⁴Long term inertia @ partial interaction, I_{aL} = 220.8 in⁴

Position Total load deflection = 7' 5" ft, in

Deflection with full shear connection n , δ = 0.240 inDeflection of steel beam alone, δ_s = 0.518 in

Minimum degree of shear connection = 26.20 %

Deflection with partial shear connection, δ = 0.278 in

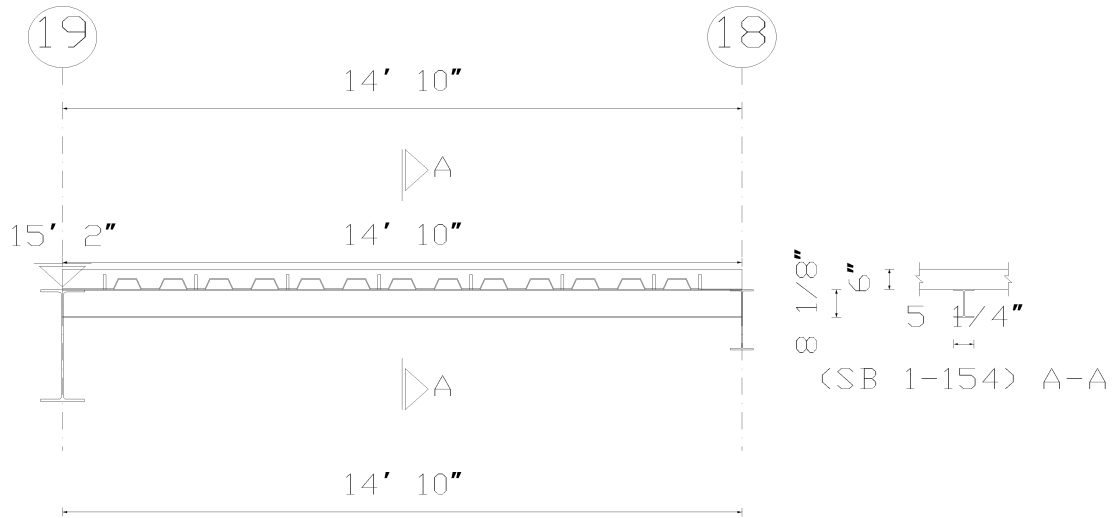
Span over limit = 0.742 in

Design limit = 0.742 in

Utilization Ratio = **0.375**

Pass

SB 1-154



Second Level: SB 1-154 - 1
W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	14' 10"	•	1.000		1.000		1.000		1.000
support	14' 10"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	11' 5"	6	1	2
12' 5"	14' 10"	2	1	1

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 3' 8 5/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.320	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	8.8	56.2	kip	0.156	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Flexure	2	32.5	107.0	kip ft	0.303	✓ Pass
Connector Resistance	2	4	8	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.011	-	in	-	-
Deflection Slab	2	0.165	0.742	in	0.223	✓ Pass
Deflection Dead	2	0.017	0.494	in	0.034	✓ Pass
Deflection Live	2	0.085	0.494	in	0.172	✓ Pass
Deflection Post Composite	2	0.102	0.494	in	0.206	✓ Pass
Deflection Total	2	0.278	0.742	in	0.375	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.4	56.2	kip	0.060	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	12.6	63.7	kip ft	0.197	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.011	-	in	-	-
Deflection Total	1	0.237	0.742	in	0.320	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 7' 5" - Critical

Moment, M_x = 12.6 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 3.4 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.060

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 5" - Critical

Dist of M_{rx} along member = 7' 5" ft, in

Required flexural strength, M_{rx1} = 12.6 kip ft



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Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3
Ratio =0.197



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =7' 5" ft, in

Max. Total load deflection =0.237 in

Span over limit =0.742 in

Design limit =0.742 in

Utilization Ratio =0.320



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 5" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w =29.900h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =8.8 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.156



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment Position - Critical

Distance of M along member =7' 5" ft, in

Required flexural strength, M_x =32.5 kip ft

Design flexural strength =107.0 kip ft

Ratio =0.303



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4

Degree of shear connection =0.262

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{aS} = 372.3 in⁴

Long term inertia, I_{aL} = 372.3 in⁴

Short term inertia @ partial interaction, I_{aS} = 220.8 in⁴

Long term inertia @ partial interaction, I_{aL} = 220.8 in⁴

Position Total load deflection = 7' 5" ft, in

Deflection with full shear connection n , δ = 0.240 in

Deflection of steel beam alone, δ_s = 0.518 in

Minimum degree of shear connection = 26.20 %

Deflection with partial shear connection, δ = 0.278 in

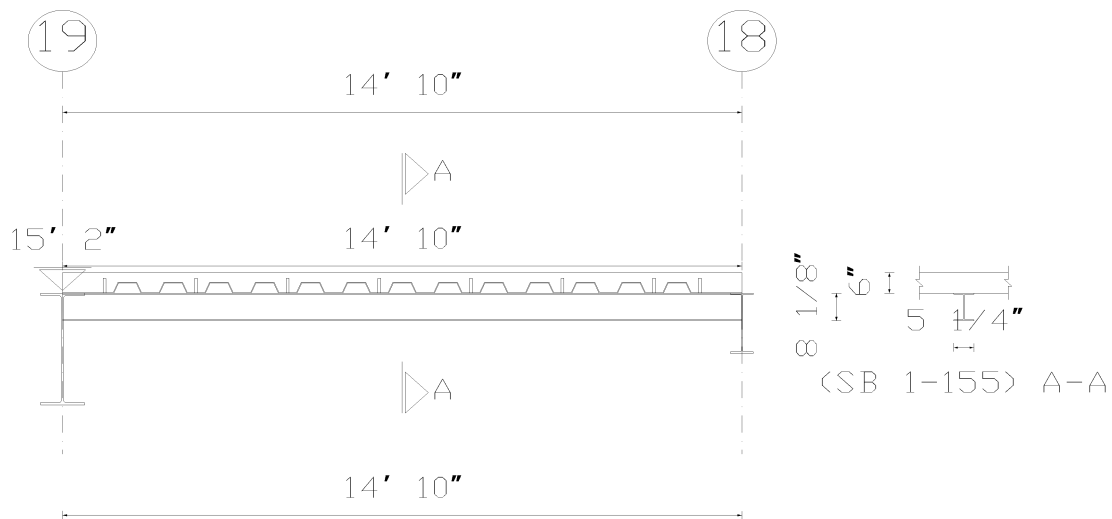
Span over limit = 0.742 in

Design limit = 0.742 in

Utilization Ratio = 0.375

✓ Pass

SB 1-155



Second Level: SB 1-155 - 1
W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	14' 10"	•	1.000		1.000		1.000		1.000
support	14' 10"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	11' 5"	6	1	2
12' 5"	14' 10"	2	1	1

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 3' 8 5/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.320	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	8.8	56.2	kip	0.156	✓ Pass
Flexure	2	32.5	107.0	kip ft	0.303	✓ Pass
Connector Resistance	2	4	8	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.011	-	in	-	-
Deflection Slab	2	0.165	0.742	in	0.223	✓ Pass
Deflection Dead	2	0.017	0.494	in	0.034	✓ Pass
Deflection Live	2	0.085	0.494	in	0.172	✓ Pass
Deflection Post Composite	2	0.102	0.494	in	0.206	✓ Pass
Deflection Total	2	0.278	0.742	in	0.375	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.4	56.2	kip	0.060	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	12.6	63.7	kip ft	0.197	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.011	-	in	-	-
Deflection Total	1	0.237	0.742	in	0.320	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical



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Flexural: Position 7' 5" - Critical

Moment, M_x =12.6 kip ft
Elastic modulus of steel, E =29000 ksi
Minimum yield stress, F_y =50.00 ksi
Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in
Required major axis shear strength, V_{ry} =3.4 kip
Design shear strength =56.2 kip AISC 360 G2
Ratio =0.060



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 5" - Critical

Dist of M_{rx} along member =7' 5" ft, in
Required flexural strength, M_{rx1} =12.6 kip ft
Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3
Ratio =0.197



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =7' 5" ft, in
Max. Total load deflection =0.237 in
Span over limit =0.742 in
Design limit =0.742 in
Utilization Ratio =0.320



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 5" - Critical

Web class Compact AISC 360 Table B4.1b
 h / t_w =29.900
 h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in
Required major axis shear strength, V_{ry} =8.8 kip
Design shear strength =56.2 kip AISC 360 G2
Ratio =0.156



Pass



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Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment Position - Critical

Distance of M along member = 7' 5" ft, in

Required flexural strength, M_x = 32.5 kip ft

Design flexural strength = 107.0 kip ft

Ratio = **0.303**

Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4Degree of shear connection = **0.262**Absolute minimum degree of shear connection = **0.250**Optimum amount of shear connection = **0.500**

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 372.3 in⁴Long term inertia, I_{aL} = 372.3 in⁴Short term inertia @ partial interaction, I_{as} = 220.8 in⁴Long term inertia @ partial interaction, I_{aL} = 220.8 in⁴

Position Total load deflection = 7' 5" ft, in

Deflection with full shear connection n , δ = 0.240 inDeflection of steel beam alone, δ_s = 0.518 in

Minimum degree of shear connection = 26.20 %

Deflection with partial shear connection, δ = 0.278 in

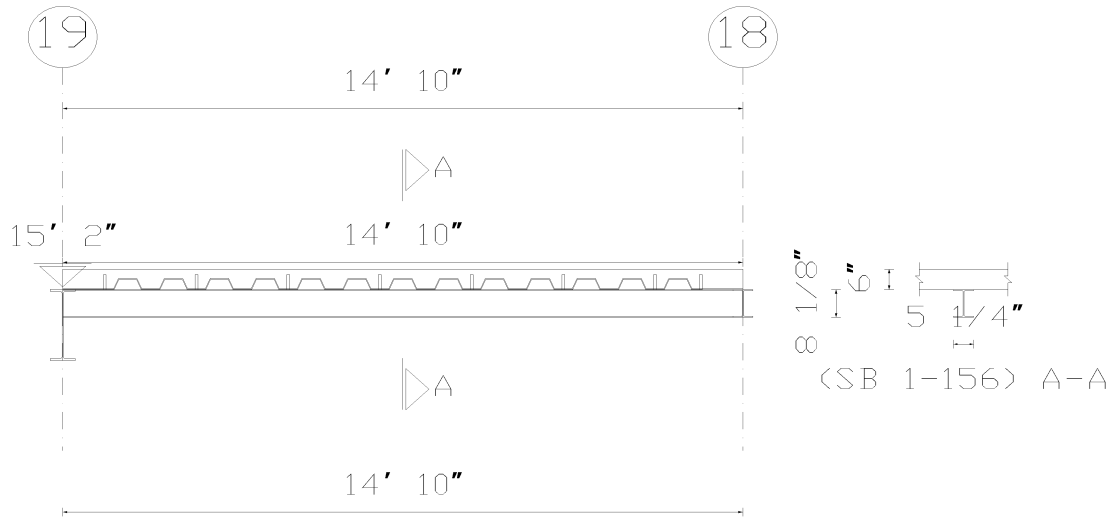
Span over limit = 0.742 in

Design limit = 0.742 in

Utilization Ratio = **0.375**

Pass

SB 1-156



Second Level: SB 1-156 = 1
 W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	14' 10"	•	1.000		1.000		1.000		1.000
support	14' 10"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
 AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	11' 5"	6	1	2
12' 5"	14' 10"	2	1	1

Decking

Manufacturer Name Gauge Yield strength
 VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
 6" ft, in 3' 8 5/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
 Type Area Yield strength Type Area Yield strength
 Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.303	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	8.3	56.2	kip	0.147	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Flexure	2	30.7	107.0	kip ft	0.287	✓ Pass
Connector Resistance	2	4	8	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.011	-	in	-	-
Deflection Slab	2	0.156	0.742	in	0.210	✓ Pass
Deflection Dead	2	0.016	0.494	in	0.032	✓ Pass
Deflection Live	2	0.080	0.494	in	0.162	✓ Pass
Deflection Post Composite	2	0.096	0.494	in	0.195	✓ Pass
Deflection Total	2	0.264	0.742	in	0.355	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.2	56.2	kip	0.057	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	11.9	63.7	kip ft	0.187	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.011	-	in	-	-
Deflection Total	1	0.225	0.742	in	0.303	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 7' 5" - Critical

Moment, M_x = 11.9 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 3.2 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.057

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 5" - Critical

Dist of M_{rx} along member = 7' 5" ft, in

Required flexural strength, M_{rx1} = 11.9 kip ft



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Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3
Ratio =0.187



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =7' 5" ft, in

Max. Total load deflection =0.225 in

Span over limit =0.742 in

Design limit =0.742 in

Utilization Ratio =0.303



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 5" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w =29.900h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =8.3 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.147



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment Position - Critical

Distance of M along member =7' 5" ft, in

Required flexural strength, M_x =30.7 kip ft

Design flexural strength =107.0 kip ft

Ratio =0.287



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4

Degree of shear connection =0.262

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{aS} = 372.3 in⁴

Long term inertia, I_{aL} = 372.3 in⁴

Short term inertia @ partial interaction, I_{aS} = 220.8 in⁴

Long term inertia @ partial interaction, I_{aL} = 220.8 in⁴

Position Total load deflection = 7' 5" ft, in

Deflection with full shear connection n , δ = 0.228 in

Deflection of steel beam alone, δ_s = 0.490 in

Minimum degree of shear connection = 26.20 %

Deflection with partial shear connection, δ = 0.264 in

Span over limit = 0.742 in

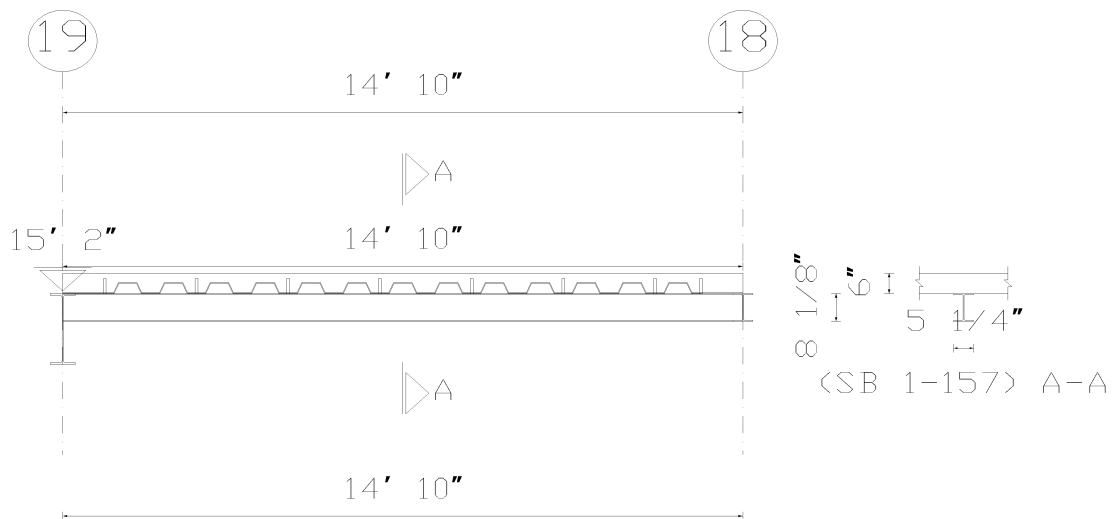
Design limit = 0.742 in

Utilization Ratio = 0.355



Pass

SB 1-157



Second Level: SB 1-157 = 1

W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	14' 10"	•	1.000		1.000		1.000		1.000
support	14' 10"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	11' 5"	6	1	2
12' 5"	14' 10"	2	1	1

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 3' 8 5/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.303	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	8.3	56.2	kip	0.147	✓ Pass
Flexure	2	30.7	107.0	kip ft	0.287	✓ Pass
Connector Resistance	2	4	8	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.011	-	in	-	-
Deflection Slab	2	0.156	0.742	in	0.210	✓ Pass
Deflection Dead	2	0.016	0.494	in	0.032	✓ Pass
Deflection Live	2	0.080	0.494	in	0.162	✓ Pass
Deflection Post Composite	2	0.096	0.494	in	0.195	✓ Pass
Deflection Total	2	0.264	0.742	in	0.355	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.2	56.2	kip	0.057	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	11.9	63.7	kip ft	0.187	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.011	-	in	-	-
Deflection Total	1	0.225	0.742	in	0.303	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical



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Flexural: Position 7' 5" - Critical

Moment, M_x =11.9 kip ft
Elastic modulus of steel, E =29000 ksi
Minimum yield stress, F_y =50.00 ksi
Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in
Required major axis shear strength, V_{ry} =3.2 kip
Design shear strength =56.2 kip AISC 360 G2
Ratio =0.057



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 5" - Critical

Dist of M_{rx} along member =7' 5" ft, in
Required flexural strength, M_{rx1} =11.9 kip ft
Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3
Ratio =0.187



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =7' 5" ft, in
Max. Total load deflection =0.225 in
Span over limit =0.742 in
Design limit =0.742 in
Utilization Ratio =0.303



Pass

Classification

2 LRF2-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 5" - Critical

Web class Compact AISC 360 Table B4.1b
 h / t_w =29.900
 h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRF2-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in
Required major axis shear strength, V_{ry} =8.3 kip
Design shear strength =56.2 kip AISC 360 G2
Ratio =0.147



Pass



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Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment Position - Critical

Distance of M along member = 7' 5" ft, in

Required flexural strength, M_x = 30.7 kip ft

Design flexural strength = 107.0 kip ft

Ratio = **0.287**

Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4Degree of shear connection = **0.262**Absolute minimum degree of shear connection = **0.250**Optimum amount of shear connection = **0.500**

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 372.3 in⁴Long term inertia, I_{aL} = 372.3 in⁴Short term inertia @ partial interaction, I_{as} = 220.8 in⁴Long term inertia @ partial interaction, I_{aL} = 220.8 in⁴

Position Total load deflection = 7' 5" ft, in

Deflection with full shear connection n , δ = 0.228 inDeflection of steel beam alone, δ_s = 0.490 in

Minimum degree of shear connection = 26.20 %

Deflection with partial shear connection, δ = 0.264 in

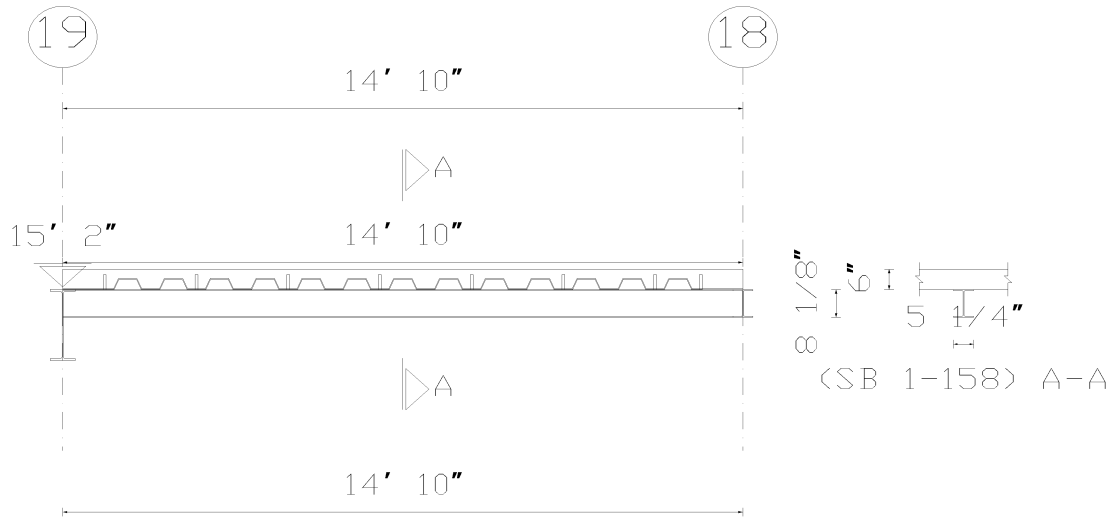
Span over limit = 0.742 in

Design limit = 0.742 in

Utilization Ratio = **0.355**

Pass

SB 1-158



Second Level: SB 1-158 = 1
W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	14' 10"	•	1.000		1.000		1.000		1.000
support	14' 10"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	11' 5"	6	1	2
12' 5"	14' 10"	2	1	1

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f'_c
6" ft, in 3' 8 5/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.303	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	8.3	56.2	kip	0.147	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Flexure	2	30.7	107.0	kip ft	0.287	✓ Pass
Connector Resistance	2	4	8	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.011	-	in	-	-
Deflection Slab	2	0.156	0.742	in	0.210	✓ Pass
Deflection Dead	2	0.016	0.494	in	0.032	✓ Pass
Deflection Live	2	0.080	0.494	in	0.162	✓ Pass
Deflection Post Composite	2	0.096	0.494	in	0.195	✓ Pass
Deflection Total	2	0.264	0.742	in	0.355	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.2	56.2	kip	0.057	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	11.9	63.7	kip ft	0.187	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.011	-	in	-	-
Deflection Total	1	0.225	0.742	in	0.303	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 7' 5" - Critical

Moment, M_x = 11.9 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 3.2 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.057

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 5" - Critical

Dist of M_{rx} along member = 7' 5" ft, in

Required flexural strength, M_{rx1} = 11.9 kip ft



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Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3
Ratio =0.187



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =7' 5" ft, in

Max. Total load deflection =0.225 in

Span over limit =0.742 in

Design limit =0.742 in

Utilization Ratio =0.303



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 5" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w =29.900h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =8.3 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.147



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment Position - Critical

Distance of M along member =7' 5" ft, in

Required flexural strength, M_x =30.7 kip ft

Design flexural strength =107.0 kip ft

Ratio =0.287



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4

Degree of shear connection =0.262

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 372.3 in⁴

Long term inertia, I_{aL} = 372.3 in⁴

Short term inertia @ partial interaction, I_{as} = 220.8 in⁴

Long term inertia @ partial interaction, I_{aL} = 220.8 in⁴

Position Total load deflection = 7' 5" ft, in

Deflection with full shear connection n , δ = 0.228 in

Deflection of steel beam alone, δ_s = 0.490 in

Minimum degree of shear connection = 26.20 %

Deflection with partial shear connection, δ = 0.264 in

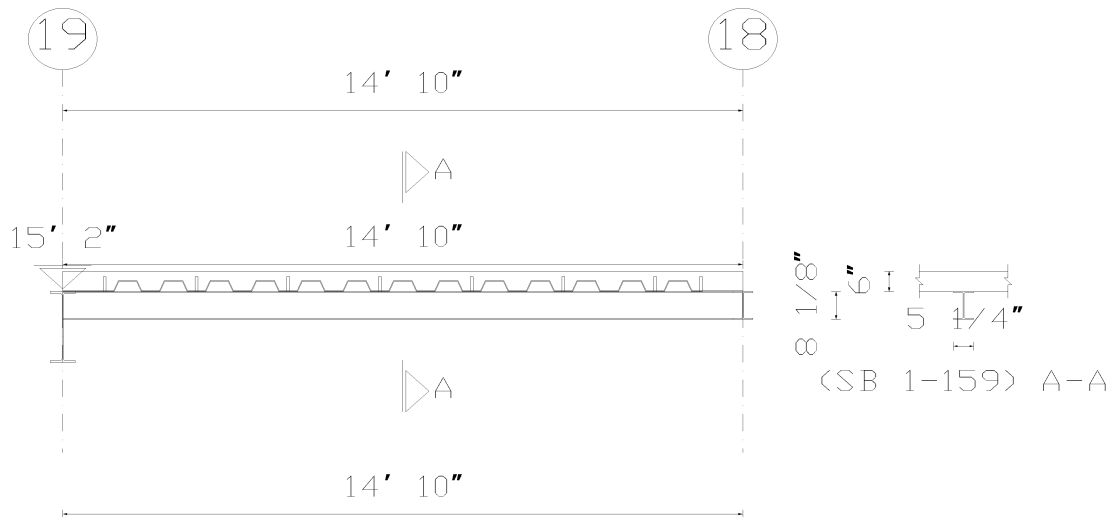
Span over limit = 0.742 in

Design limit = 0.742 in

Utilization Ratio = 0.355

✓ Pass

SB 1-159



Second Level: SB 1-159 = 1
W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	14' 10"	•	1.000		1.000		1.000		1.000
support	14' 10"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	11' 5"	6	1	2
12' 5"	14' 10"	2	1	1

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 3' 8 5/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.303	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	8.3	56.2	kip	0.147	✓ Pass
Flexure	2	30.7	107.0	kip ft	0.287	✓ Pass
Connector Resistance	2	4	8	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.011	-	in	-	-
Deflection Slab	2	0.156	0.742	in	0.210	✓ Pass
Deflection Dead	2	0.016	0.494	in	0.032	✓ Pass
Deflection Live	2	0.080	0.494	in	0.162	✓ Pass
Deflection Post Composite	2	0.096	0.494	in	0.195	✓ Pass
Deflection Total	2	0.264	0.742	in	0.355	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.2	56.2	kip	0.057	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	11.9	63.7	kip ft	0.187	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.011	-	in	-	-
Deflection Total	1	0.225	0.742	in	0.303	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical



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Flexural: Position 7' 5" - Critical

Moment, M_x =11.9 kip ft
Elastic modulus of steel, E =29000 ksi
Minimum yield stress, F_y =50.00 ksi
Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in
Required major axis shear strength, V_{ry} =3.2 kip
Design shear strength =56.2 kip AISC 360 G2
Ratio =0.057



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 5" - Critical

Dist of M_{rx} along member =7' 5" ft, in
Required flexural strength, M_{rx1} =11.9 kip ft
Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3
Ratio =0.187



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =7' 5" ft, in
Max. Total load deflection =0.225 in
Span over limit =0.742 in
Design limit =0.742 in
Utilization Ratio =0.303



Pass

Classification

2 LRF2-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 5" - Critical

Web class Compact AISC 360 Table B4.1b
 h / t_w =29.900
 h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRF2-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in
Required major axis shear strength, V_{ry} =8.3 kip
Design shear strength =56.2 kip AISC 360 G2
Ratio =0.147



Pass



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Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment Position - Critical

Distance of M along member = 7' 5" ft, in

Required flexural strength, M_x = 30.7 kip ft

Design flexural strength = 107.0 kip ft

Ratio = **0.287**

Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4Degree of shear connection = **0.262**Absolute minimum degree of shear connection = **0.250**Optimum amount of shear connection = **0.500**

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 372.3 in⁴Long term inertia, I_{aL} = 372.3 in⁴Short term inertia @ partial interaction, I_{as} = 220.8 in⁴Long term inertia @ partial interaction, I_{aL} = 220.8 in⁴

Position Total load deflection = 7' 5" ft, in

Deflection with full shear connection n , δ = 0.228 inDeflection of steel beam alone, δ_s = 0.490 in

Minimum degree of shear connection = 26.20 %

Deflection with partial shear connection, δ = 0.264 in

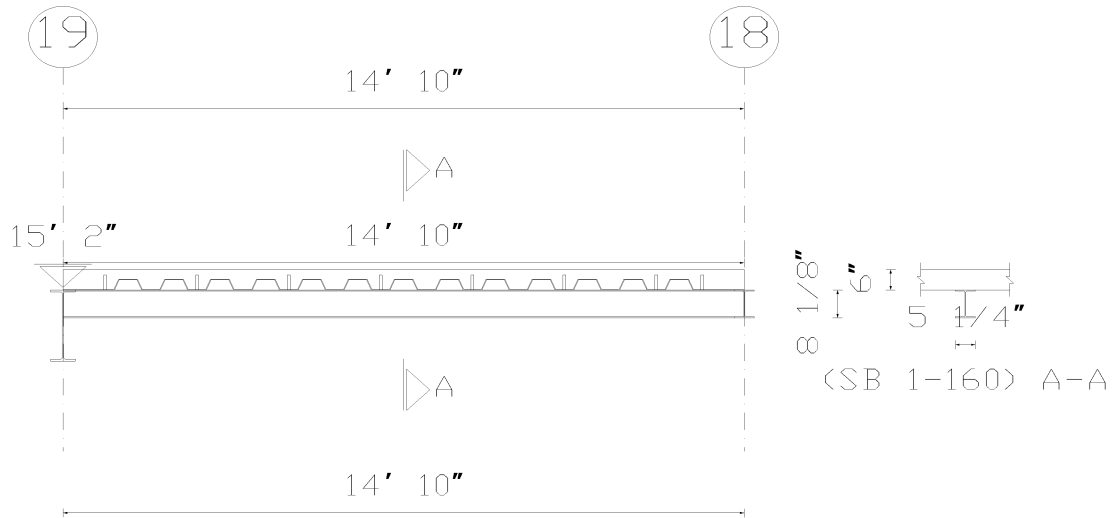
Span over limit = 0.742 in

Design limit = 0.742 in

Utilization Ratio = **0.355**

Pass

SB 1-160



Second Level: SB 1-160 - 1
W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	14' 10"	•	1.000		1.000		1.000		1.000
support	14' 10"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	11' 5"	6	1	2
12' 5"	14' 10"	2	1	1

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 3' 8 5/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.303	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	8.3	56.2	kip	0.147	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Flexure	2	30.7	107.0	kip ft	0.287	✓ Pass
Connector Resistance	2	4	8	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.011	-	in	-	-
Deflection Slab	2	0.156	0.742	in	0.210	✓ Pass
Deflection Dead	2	0.016	0.494	in	0.032	✓ Pass
Deflection Live	2	0.080	0.494	in	0.162	✓ Pass
Deflection Post Composite	2	0.096	0.494	in	0.195	✓ Pass
Deflection Total	2	0.264	0.742	in	0.355	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.2	56.2	kip	0.057	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	11.9	63.7	kip ft	0.187	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.011	-	in	-	-
Deflection Total	1	0.225	0.742	in	0.303	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 7' 5" - Critical

Moment, M_x = 11.9 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 3.2 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.057

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 5" - Critical

Dist of M_{rx} along member = 7' 5" ft, in

Required flexural strength, M_{rx1} = 11.9 kip ft



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Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3
Ratio =0.187



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =7' 5" ft, in

Max. Total load deflection =0.225 in

Span over limit =0.742 in

Design limit =0.742 in

Utilization Ratio =0.303



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 5" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w =29.900h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =8.3 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.147



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment Position - Critical

Distance of M along member =7' 5" ft, in

Required flexural strength, M_x =30.7 kip ft

Design flexural strength =107.0 kip ft

Ratio =0.287



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4

Degree of shear connection =0.262

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 372.3 in⁴

Long term inertia, I_{aL} = 372.3 in⁴

Short term inertia @ partial interaction, I_{as} = 220.8 in⁴

Long term inertia @ partial interaction, I_{aL} = 220.8 in⁴

Position Total load deflection = 7' 5" ft, in

Deflection with full shear connection n, δ = 0.228 in

Deflection of steel beam alone, δ_s = 0.490 in

Minimum degree of shear connection = 26.20 %

Deflection with partial shear connection, δ = 0.264 in

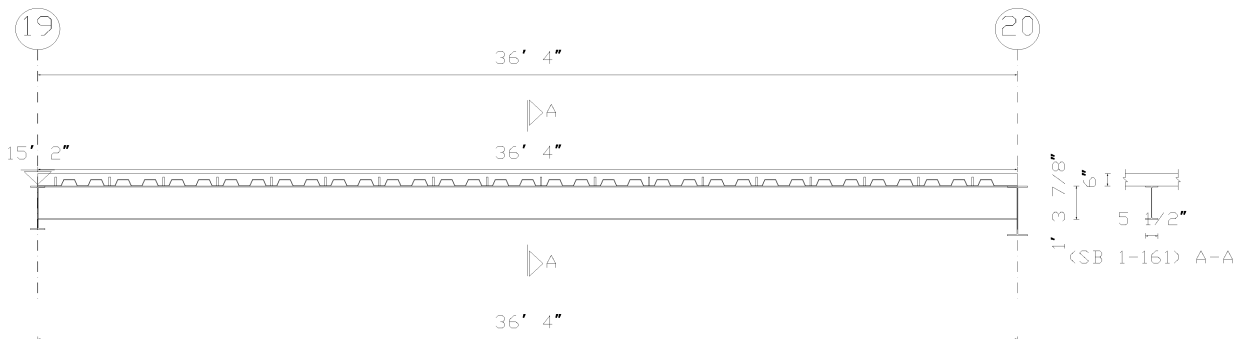
Span over limit = 0.742 in

Design limit = 0.742 in

Utilization Ratio = 0.355

✓ Pass

SB 1-161



Second Level: SB 1-161 = 1
 W 16x31 A992-50 (18) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	36' 4"	•	1.000		1.000		1.000		1.000
support	36' 4"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
 AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	35' 2"	18	1	2

Decking

Manufacturer Name Gauge Yield strength
 VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab



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Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
 6" ft, in 4' 3 7/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
 Type Area Yield strength Type Area Yield strength
 Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 16x31 (18)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.752	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	20.6	131.2	kip	0.157	✓ Pass
Flexure	2	186.9	327.4	kip ft	0.571	✓ Pass
Connector Resistance	2	9	18	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.113	-	in	-	-
Deflection Slab	2	0.914	1.817	in	0.503	✓ Pass
Deflection Dead	2	0.126	1.211	in	0.104	✓ Pass
Deflection Live	2	0.630	1.211	in	0.520	✓ Pass
Deflection Post Composite	2	0.756	1.211	in	0.624	✓ Pass
Deflection Total	2	1.783	1.817	in	0.981	✓ Pass

Construction Stage

W 16x31(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	8.2	131.2	kip	0.062	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	74.2	202.5	kip ft	0.366	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.113	-	in	-	-
Deflection Total	1	1.366	1.817	in	0.752	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Flexural: Position 18' 2" - Critical

Moment, M_x = 74.2 kip ftElastic modulus of steel, E = 29000 ksiMinimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Position 0" - Critical



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Position of V_{ry} = 0" ft, in
Required major axis shear strength, V_{ry} = 8.2 kip
Design shear strength = 131.2 kip AISC 360 G2
Ratio = **0.062**



Pass

Flexure Major

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Yielding: 18' 2" - Critical

Dist of M_{rx} along member = 18' 2" ft, in
Required flexural strength, M_{rx1} = 74.2 kip ft
Design flexural strength = 202.5 kip ft AISC 360 F1, F2 and F3
Ratio = **0.366**



Pass

Deflection

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 18' 2" ft, in
Max. Total load deflection = 1.366 in
Span over limit = 1.817 in
Design limit = 1.817 in
Utilization Ratio = **0.752**



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

Position 18' 2" - Critical

Web class Compact AISC 360 Table B4.1b
 h / t_w = **51.600**
 h / t_w limit for plastic stress distribution = **90.553**

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in
Required major axis shear strength, V_{ry} = 20.6 kip
Design shear strength = 131.2 kip AISC 360 G2
Ratio = **0.157**



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

18' 2" Max Moment Position - Critical

Distance of M along member = 18' 2" ft, in
Required flexural strength, M_x = 186.9 kip ft
Design flexural strength = 327.4 kip ft
Ratio = **0.571**



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

18' 2" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 18

Number of shear connectors to critical point, N_a 9

Degree of shear connection = 0.340

Absolute minimum degree of shear connection = 0.250

Optimum amount of shear connection = 0.500

Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 1367.8 in⁴

Long term inertia, I_{al} = 1367.8 in⁴

Short term inertia @ partial interaction, I_{as} = 953.6 in⁴

Long term inertia @ partial interaction, I_{al} = 953.6 in⁴

Position Total load deflection = 18' 2" ft, in

Deflection with full shear connection n , δ = 1.560 in

Deflection of steel beam alone, δ_s = 2.917 in

Minimum degree of shear connection = 33.97 %

Deflection with partial shear connection, δ = 1.783 in

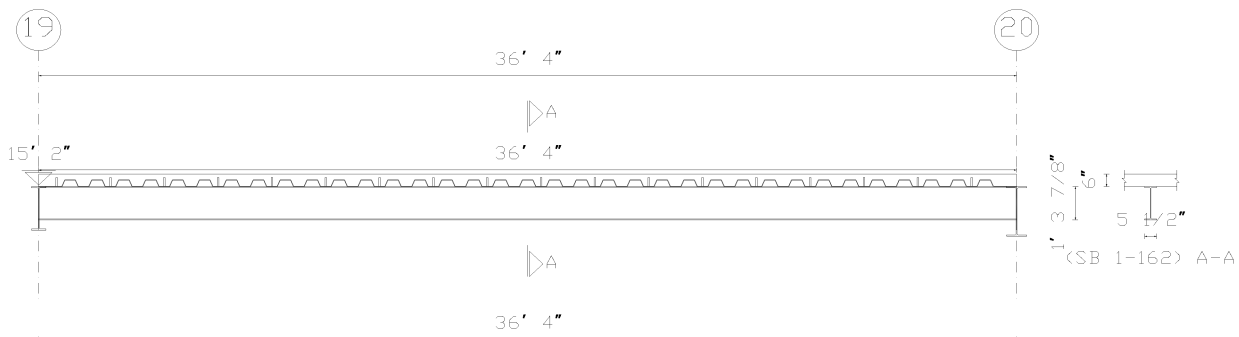
Span over limit = 1.817 in

Design limit = 1.817 in

Utilization Ratio = 0.981

✓ Pass

SB 1-162



Second Level: SB 1-162 = 1
W 16x31 A992-50 (18) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	36' 4"	•	1.000	•	1.000	•	1.000	•	1.000
support	36' 4"	•		•		•		•	



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Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	35' 2"	18	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 3 7/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 16x31 (18)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.752	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	20.6	131.2	kip	0.157	✓ Pass
Flexure	2	186.9	327.4	kip ft	0.571	✓ Pass
Connector Resistance	2	9	18	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.113	-	in	-	-
Deflection Slab	2	0.914	1.817	in	0.503	✓ Pass
Deflection Dead	2	0.126	1.211	in	0.104	✓ Pass
Deflection Live	2	0.630	1.211	in	0.520	✓ Pass
Deflection Post Composite	2	0.756	1.211	in	0.624	✓ Pass
Deflection Total	2	1.783	1.817	in	0.981	✓ Pass

Construction Stage

W 16x31(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	8.2	131.2	kip	0.062	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	74.2	202.5	kip ft	0.366	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.113	-	in	-	-
Deflection Total	1	1.366	1.817	in	0.752	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification



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1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Flexural: Position 18' 2" - Critical

Moment, M_x = 74.2 kip ftElastic modulus of steel, E = 29000 ksiMinimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 8.2 kip

Design shear strength = 131.2 kip AISC 360 G2

Ratio = 0.062



Pass

Flexure Major

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Yielding: 18' 2" - Critical

Dist of M_{rx} along member = 18' 2" ft, inRequired flexural strength, M_{rx1} = 74.2 kip ft

Design flexural strength = 202.5 kip ft AISC 360 F1, F2 and F3

Ratio = 0.366



Pass

Deflection

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 18' 2" ft, in

Max. Total load deflection = 1.366 in

Span over limit = 1.817 in

Design limit = 1.817 in

Utilization Ratio = 0.752



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

Position 18' 2" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w = 51.600 h / t_w limit for plastic stress distribution = 90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 20.6 kip

Design shear strength = 131.2 kip AISC 360 G2



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Ratio **=0.157**

✓ Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

18' 2" Max Moment Position - Critical

Distance of M along member =18' 2" ft, in

Required flexural strength, M_x =186.9 kip ft

Design flexural strength =327.4 kip ft

Ratio **=0.571**

✓ Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

18' 2" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 18

Number of shear connectors to critical point, N_a 9Degree of shear connection **=0.340**Absolute minimum degree of shear connection **=0.250**Optimum amount of shear connection **=0.500**

Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} =1367.8 in⁴Long term inertia, I_{aL} =1367.8 in⁴Short term inertia @ partial interaction, I_{as} =953.6 in⁴Long term inertia @ partial interaction, I_{aL} =953.6 in⁴

Position Total load deflection =18' 2" ft, in

Deflection with full shear connection n , δ =1.560 inDeflection of steel beam alone, δ_s =2.917 in

Minimum degree of shear connection =33.97 %

Deflection with partial shear connection, δ =1.783 in

Span over limit =1.817 in

Design limit =1.817 in

Utilization Ratio **=0.981**

✓ Pass

SB 1-163



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Total	2	1.783	1.817	in	0.981	✓ Pass

Construction Stage

W 16x31(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	8.2	131.2	kip	0.062	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	74.2	202.5	kip ft	0.366	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.113	-	in	-	-
Deflection Total	1	1.366	1.817	in	0.752	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Flexural: Position 18' 2" - Critical

Moment, M_x =74.2 kip ft

Elastic modulus of steel, E =29000 ksi

Minimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in

Required major axis shear strength, V_{ry} =8.2 kip

Design shear strength =131.2 kip AISC 360 G2

Ratio =0.062

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Yielding: 18' 2" - Critical

Dist of M_{rx} along member =18' 2" ft, in

Required flexural strength, M_{rx1} =74.2 kip ft

Design flexural strength =202.5 kip ft AISC 360 F1, F2 and F3

Ratio =0.366

✓ Pass

Deflection

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Deflection Total - Critical



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Position Total load deflection =18' 2" ft, in
Max. Total load deflection =1.366 in
Span over limit =1.817 in
Design limit =1.817 in
Utilization Ratio =0.752



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

Position 18' 2" - Critical

Web class Compact AISC 360 Table B4.1b
h / t_w =51.600
h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in
Required major axis shear strength, V_{ry} =20.6 kip
Design shear strength =131.2 kip AISC 360 G2
Ratio =0.157



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

18' 2" Max Moment Position - Critical

Distance of M along member =18' 2" ft, in
Required flexural strength, M_x =186.9 kip ft
Design flexural strength =327.4 kip ft
Ratio =0.571



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

18' 2" Max Moment and UR Position - Critical

Layout and strength of shear connectors
Maximum group spacing, s =2' 0" ft, in
Maximum permitted group spacing =3' 0" ft, in
Number of shear connectors over full beam length 18
Number of shear connectors to critical point, N_a 9
Degree of shear connection =0.340
Absolute minimum degree of shear connection =0.250
Optimum amount of shear connection =0.500
Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

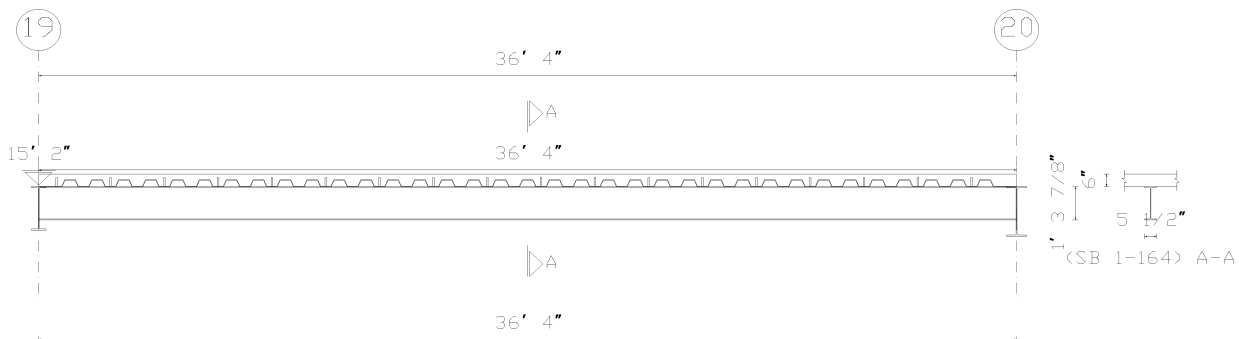
Deflection Total - Critical

Short term inertia, I_{as} =1367.8 in⁴

Long term inertia, $I_{\alpha L}$ =1367.8 in⁴
Short term inertia @ partial interaction, $I_{\alpha S}$ =953.6 in⁴
Long term inertia @ partial interaction, $I_{\alpha L}$ =953.6 in⁴
Position Total load deflection =18' 2" ft, in
Deflection with full shear connection n , δ =1.560 in
Deflection of steel beam alone, δ_s =2.917 in
Minimum degree of shear connection =33.97 %
Deflection with partial shear connection, δ =1.783 in
Span over limit =1.817 in
Design limit =1.817 in
Utilization Ratio =0.981

✓ Pass

SB 1-164



Second Level: SB 1-164 = 1
W 16x31 A992-50 (18) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	36' 4"	•	1.000		1.000		1.000		1.000
support	36' 4"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	35' 2"	18	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 3 7/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 16x31 (18)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.752	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-20.6	131.2	kip	0.157	✓ Pass
Flexure	2	186.9	327.4	kip ft	0.571	✓ Pass
Connector Resistance	2	9	18	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.113	-	in	-	-
Deflection Slab	2	0.914	1.817	in	0.503	✓ Pass
Deflection Dead	2	0.126	1.211	in	0.104	✓ Pass
Deflection Live	2	0.630	1.211	in	0.520	✓ Pass
Deflection Post Composite	2	0.756	1.211	in	0.624	✓ Pass
Deflection Total	2	1.783	1.817	in	0.981	✓ Pass

Construction Stage

W 16x31(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	8.2	131.2	kip	0.062	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	74.2	202.5	kip ft	0.366	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.113	-	in	-	-
Deflection Total	1	1.366	1.817	in	0.752	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Flexural: Position 18' 2" - Critical

Moment, M_x = 74.2 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 8.2 kip

Design shear strength = 131.2 kip AISC 360 G2

Ratio = 0.062

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical



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Yielding: 18' 2" - Critical

Dist of M_{rx} along member = 18' 2" ft, inRequired flexural strength, M_{rx1} = 74.2 kip ft

Design flexural strength = 202.5 kip ft AISC 360 F1, F2 and F3

Ratio = 0.366



Pass

Deflection

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 18' 2" ft, in

Max. Total load deflection = 1.366 in

Span over limit = 1.817 in

Design limit = 1.817 in

Utilization Ratio = 0.752



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

Position 18' 2" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w = 51.600h / t_w limit for plastic stress distribution = 90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

Position 36' 4" - Critical

Position of V_{ry} = 36' 4" ft, inRequired major axis shear strength, V_{ry} = 20.6 kip

Design shear strength = 131.2 kip AISC 360 G2

Ratio = 0.157



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

18' 2" Max Moment Position - Critical

Distance of M along member = 18' 2" ft, in

Required flexural strength, M_x = 186.9 kip ft

Design flexural strength = 327.4 kip ft

Ratio = 0.571



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

18' 2" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 18

Number of shear connectors to critical point, N_a 9

Degree of shear connection = **0.340**
Absolute minimum degree of shear connection = **0.250**
Optimum amount of shear connection = **0.500**
Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

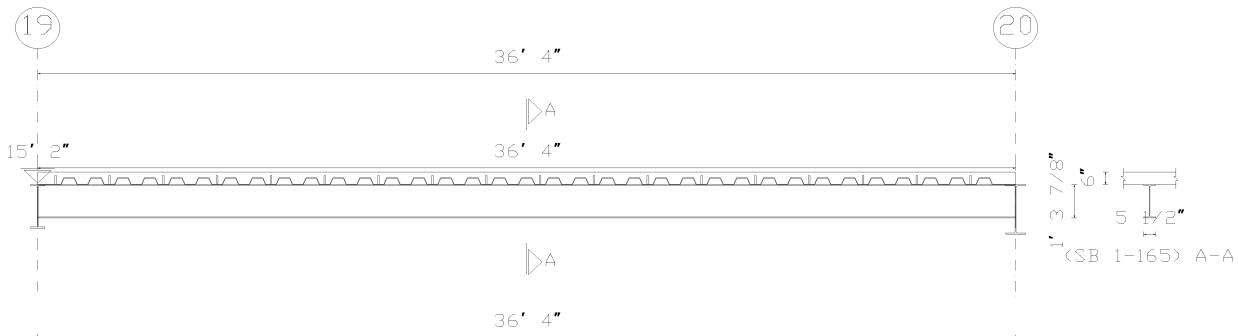
Span 1 W 16x31 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 1367.8 in⁴
Long term inertia, I_{at} = 1367.8 in⁴
Short term inertia @ partial interaction, I_{as} = 953.6 in⁴
Long term inertia @ partial interaction, I_{at} = 953.6 in⁴
Position Total load deflection = 18' 2" ft, in
Deflection with full shear connection n, δ = 1.560 in
Deflection of steel beam alone, δ_s = 2.917 in
Minimum degree of shear connection = 33.97 %
Deflection with partial shear connection, δ = 1.783 in
Span over limit = 1.817 in
Design limit = 1.817 in
Utilization Ratio = **0.981**

✓ Pass

SB 1-165



Second Level: SB 1-165 = 1
W 16x31 A992-50 (18) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	36' 4"	•	1.000		1.000		1.000		1.000
support	36' 4"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	35' 2"	18	1	2

Decking

Manufacturer Name Gauge Yield strength



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VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 3 7/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 16x31 (18)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.752	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	20.6	131.2	kip	0.157	✓ Pass
Flexure	2	186.9	327.4	kip ft	0.571	✓ Pass
Connector Resistance	2	9	18	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.113	-	in	-	-
Deflection Slab	2	0.914	1.817	in	0.503	✓ Pass
Deflection Dead	2	0.126	1.211	in	0.104	✓ Pass
Deflection Live	2	0.630	1.211	in	0.520	✓ Pass
Deflection Post Composite	2	0.756	1.211	in	0.624	✓ Pass
Deflection Total	2	1.783	1.817	in	0.981	✓ Pass

Construction Stage

W 16x31(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	8.2	131.2	kip	0.062	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	74.2	202.5	kip ft	0.366	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.113	-	in	-	-
Deflection Total	1	1.366	1.817	in	0.752	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Flexural: Position 18' 2" - Critical

Moment, M_x = 74.2 kip ftElastic modulus of steel, E = 29000 ksiMinimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major



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1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 8.2 kip

Design shear strength = 131.2 kip AISC 360 G2

Ratio = 0.062



Pass

Flexure Major

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Yielding: 18' 2" - Critical

Dist of M_{rx} along member = 18' 2" ft, inRequired flexural strength, M_{rx1} = 74.2 kip ft

Design flexural strength = 202.5 kip ft AISC 360 F1, F2 and F3

Ratio = 0.366



Pass

Deflection

1 Construction Stage

Span 1 W 16x31 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 18' 2" ft, in

Max. Total load deflection = 1.366 in

Span over limit = 1.817 in

Design limit = 1.817 in

Utilization Ratio = 0.752



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

Position 18' 2" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w = 51.600 h / t_w limit for plastic stress distribution = 90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 20.6 kip

Design shear strength = 131.2 kip AISC 360 G2

Ratio = 0.157



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

18' 2" Max Moment Position - Critical

Distance of M along member = 18' 2" ft, in

Required flexural strength, M_x = 186.9 kip ft

Design flexural strength =327.4 kip ft

Ratio =0.571



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

18' 2" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 18

Number of shear connectors to critical point, N_a 9

Degree of shear connection =0.340

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x31 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} =1367.8 in⁴

Long term inertia, I_{atL} =1367.8 in⁴

Short term inertia @ partial interaction, I_{as} =953.6 in⁴

Long term inertia @ partial interaction, I_{atL} =953.6 in⁴

Position Total load deflection =18' 2" ft, in

Deflection with full shear connection n, δ =1.560 in

Deflection of steel beam alone, δ_s =2.917 in

Minimum degree of shear connection =33.97 %

Deflection with partial shear connection, δ =1.783 in

Span over limit =1.817 in

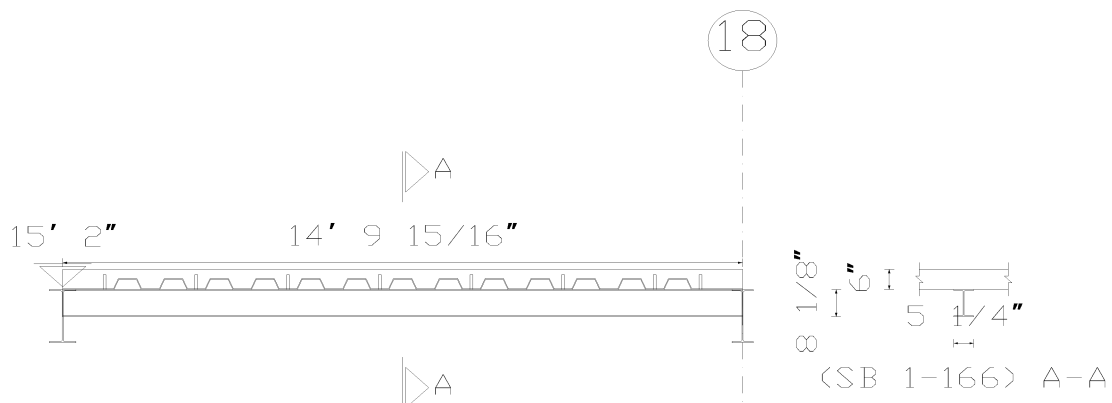
Design limit =1.817 in

Utilization Ratio =0.981



Pass

SB 1-166



Second Level: SB 1-166 = 1
 W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	14' 10"	•	1.000		1.000		1.000		1.000
support	14' 10"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	11' 5"	6	1	2
12' 5"	14' 10"	2	1	1

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 3' 8 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.340	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	9.3	56.2	kip	0.166	✓ Pass
Flexure	2	34.6	107.0	kip ft	0.323	✓ Pass
Connector Resistance	2	4	8	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.011	-	in	-	-
Deflection Slab	2	0.176	0.741	in	0.237	✓ Pass
Deflection Dead	2	0.018	0.494	in	0.037	✓ Pass
Deflection Live	2	0.091	0.494	in	0.183	✓ Pass
Deflection Post Composite	2	0.109	0.494	in	0.220	✓ Pass
Deflection Total	2	0.296	0.741	in	0.399	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	3.6	56.2	kip	0.064	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	13.4	63.7	kip ft	0.210	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.011	-	in	-	-
Deflection Total	1	0.252	0.741	in	0.340	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 7' 5" - Critical

Moment, M_x =13.4 kip ft

Elastic modulus of steel, E =29000 ksi

Minimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in

Required major axis shear strength, V_{ry} =3.6 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.064

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 5" - Critical

Dist of M_{rx} along member =7' 5" ft, in

Required flexural strength, M_{rx1} =13.4 kip ft

Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3

Ratio =0.210

✓ Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =7' 5" ft, in

Max. Total load deflection =0.252 in

Span over limit =0.741 in

Design limit =0.741 in

Utilization Ratio =0.340

✓ Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 5" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w =29.900



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h / t_w limit for plastic stress distribution = **90.553**

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 9.3 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = **0.166**



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment Position - Critical

Distance of M along member = 7' 5" ft, in

Required flexural strength, M_x = 34.6 kip ft

Design flexural strength = 107.0 kip ft

Ratio = **0.323**



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4

Degree of shear connection = **0.262**

Absolute minimum degree of shear connection = **0.250**

Optimum amount of shear connection = **0.500**

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 372.0 in⁴

Long term inertia, I_{al} = 372.0 in⁴

Short term inertia @ partial interaction, I_{as} = 220.7 in⁴

Long term inertia @ partial interaction, I_{al} = 220.7 in⁴

Position Total load deflection = 7' 5" ft, in

Deflection with full shear connection n , δ = 0.255 in

Deflection of steel beam alone, δ_s = 0.551 in

Minimum degree of shear connection = 26.20 %

Deflection with partial shear connection, δ = 0.296 in

Span over limit = 0.741 in

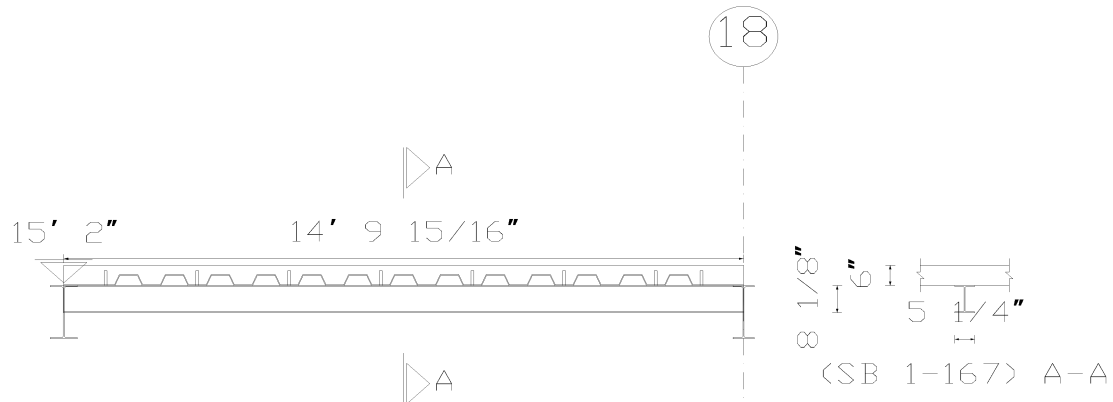
Design limit = 0.741 in

Utilization Ratio = **0.399**



Pass

SB 1-167



Second Level: SB 1-167 - 1
W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	14' 9 7/8"	•	1.000		1.000		1.000		1.000
support	14' 9 7/8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	11' 5"	6	1	2
12' 5"	14' 9 7/8"	2	1	1

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 3' 8 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.340	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-9.3	56.2	kip	0.166	✓ Pass
Flexure	2	34.6	107.0	kip ft	0.323	✓ Pass
Connector Resistance	2	4	8		-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Self weight	2	0.011	-	in	-	-
Deflection Slab	2	0.176	0.741	in	0.237	✓ Pass
Deflection Dead	2	0.018	0.494	in	0.037	✓ Pass
Deflection Live	2	0.091	0.494	in	0.183	✓ Pass
Deflection Post Composite	2	0.109	0.494	in	0.220	✓ Pass
Deflection Total	2	0.296	0.741	in	0.399	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-3.6	56.2	kip	0.064	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	13.4	63.7	kip ft	0.210	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.011	-	in	-	-
Deflection Total	1	0.252	0.741	in	0.340	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 7' 5" - Critical

Moment, M_x = 13.4 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 14' 9 7/8" - Critical

Position of V_{ry} = 14' 9 7/8" ft, in

Required major axis shear strength, V_{ry} = -3.6 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.064



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 5" - Critical

Dist of M_{rx} along member = 7' 5" ft, in

Required flexural strength, M_{rx1} = 13.4 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.210



Pass



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Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =7' 5" ft, in
Max. Total load deflection =0.252 in
Span over limit =0.741 in
Design limit =0.741 in
Utilization Ratio =**0.340**



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 5" - Critical

Web class Compact AISC 360 Table B4.1b
h / t_w =**29.900**
h / t_w limit for plastic stress distribution =**90.553**

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 14' 9 7/8" - Critical

Position of V_{ry} =14' 9 7/8" ft, in
Required major axis shear strength, V_{ry} =-9.3 kip
Design shear strength =56.2 kip AISC 360 G2
Ratio =**0.166**



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment Position - Critical

Distance of M along member =7' 5" ft, in
Required flexural strength, M_x =34.6 kip ft
Design flexural strength =107.0 kip ft
Ratio =**0.323**



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment and UR Position - Critical

Layout and strength of shear connectors
Maximum group spacing, s =2' 0" ft, in
Maximum permitted group spacing =3' 0" ft, in
Number of shear connectors over full beam length 8
Number of shear connectors to critical point, N_a 4
Degree of shear connection =**0.262**
Absolute minimum degree of shear connection =**0.250**
Optimum amount of shear connection =**0.500**
Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

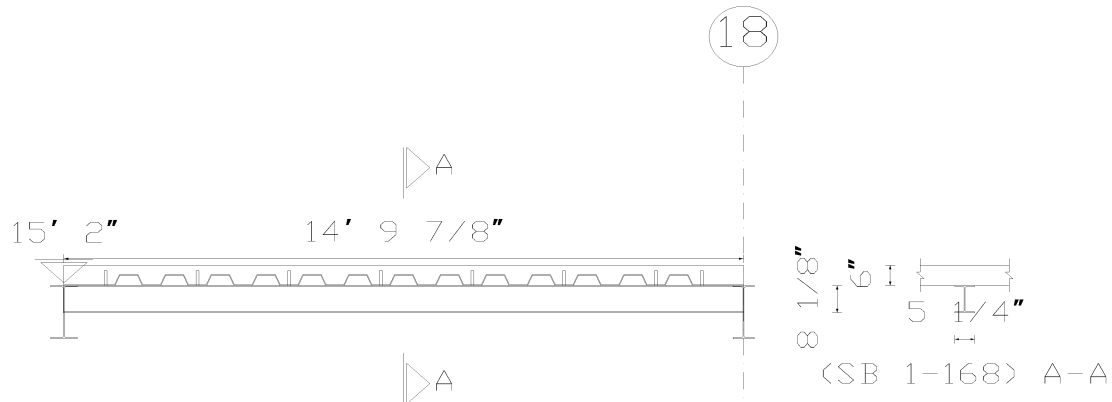
Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as}	=372.0 in ⁴
Long term inertia, I_{al}	=372.0 in ⁴
Short term inertia @ partial interaction, I_{as}	=220.7 in ⁴
Long term inertia @ partial interaction, I_{al}	=220.7 in ⁴
Position Total load deflection	=7' 5" ft, in
Deflection with full shear connection n , δ	=0.255 in
Deflection of steel beam alone, δ_s	=0.550 in
Minimum degree of shear connection	=26.20 %
Deflection with partial shear connection, δ	=0.296 in
Span over limit	=0.741 in
Design limit	=0.741 in
Utilization Ratio	=0.399

✓ Pass

SB 1-168



Second Level: SB 1-168 = 1
W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	14' 9 7/8"	•	1.000		1.000		1.000		1.000
support	14' 9 7/8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	11' 5"	6	1	2
12' 5"	14' 9 7/8"	2	1	1

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi



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Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 3' 8 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.340	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-9.3	56.2	kip	0.166	✓ Pass
Flexure	2	34.5	107.0	kip ft	0.323	✓ Pass
Connector Resistance	2	4	8	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.011	-	in	-	-
Deflection Slab	2	0.176	0.741	in	0.237	✓ Pass
Deflection Dead	2	0.018	0.494	in	0.037	✓ Pass
Deflection Live	2	0.090	0.494	in	0.183	✓ Pass
Deflection Post Composite	2	0.109	0.494	in	0.220	✓ Pass
Deflection Total	2	0.295	0.741	in	0.398	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-3.6	56.2	kip	0.064	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	13.4	63.7	kip ft	0.210	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.011	-	in	-	-
Deflection Total	1	0.252	0.741	in	0.340	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 7' 5" - Critical

Moment, M_x =13.4 kip ftElastic modulus of steel, E =29000 ksiMinimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage



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Span 1 W 8x18 A992-50 - Critical

Position 14' 9 7/8" - Critical

Position of V_{ry} = 14' 9 7/8" ft, inRequired major axis shear strength, V_{ry} = -3.6 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.064



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 5" - Critical

Dist of M_{rx} along member = 7' 5" ft, inRequired flexural strength, M_{rx1} = 13.4 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.210



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 7' 5" ft, in

Max. Total load deflection = 0.252 in

Span over limit = 0.741 in

Design limit = 0.741 in

Utilization Ratio = 0.340



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 5" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w = 29.900 h / t_w limit for plastic stress distribution = 90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 14' 9 7/8" - Critical

Position of V_{ry} = 14' 9 7/8" ft, inRequired major axis shear strength, V_{ry} = -9.3 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.166



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment Position - Critical

Distance of M along member = 7' 5" ft, in

Required flexural strength, M_x = 34.5 kip ft

Design flexural strength = 107.0 kip ft

Ratio =0.323



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 5" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4

Degree of shear connection =0.262

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} =372.0 in⁴

Long term inertia, I_{al} =372.0 in⁴

Short term inertia @ partial interaction, I_{as} =220.7 in⁴

Long term inertia @ partial interaction, I_{al} =220.7 in⁴

Position Total load deflection =7' 5" ft, in

Deflection with full shear connection n, δ =0.255 in

Deflection of steel beam alone, δ_s =0.550 in

Minimum degree of shear connection =26.20 %

Deflection with partial shear connection, δ =0.295 in

Span over limit =0.741 in

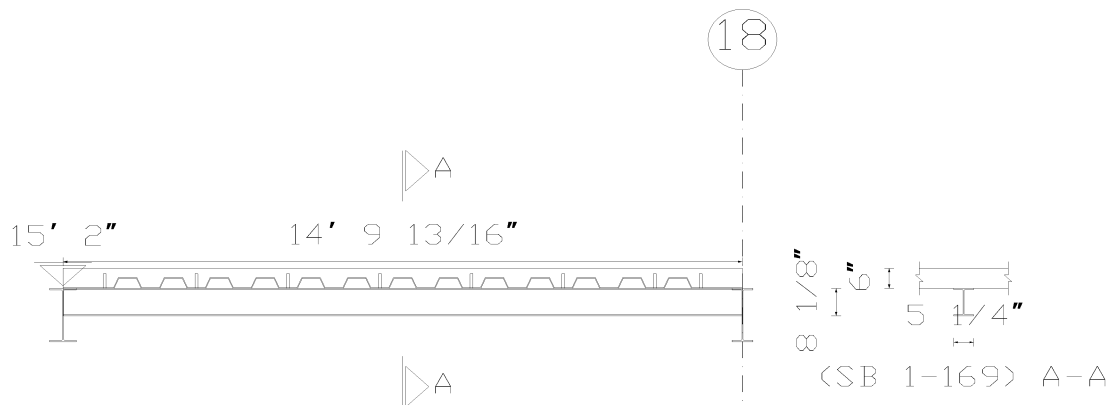
Design limit =0.741 in

Utilization Ratio =0.398



Pass

SB 1-169



Second Level: SB 1-169 = 1
 W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	14' 9 7/8"	•	1.000		1.000		1.000		1.000
support	14' 9 7/8"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength

AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	11' 4 7/8"	6	1	2
12' 4 7/8"	14' 9 7/8"	2	1	1

Decking

Manufacturer Name Gauge Yield strength

VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'

6" ft, in 3' 8 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements

Type Area Yield strength Type Area Yield strength

Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.340	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-9.3	56.2	kip	0.166	✓ Pass
Flexure	2	34.5	107.0	kip ft	0.323	✓ Pass
Connector Resistance	2	4	8	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.011	-	in	-	-
Deflection Slab	2	0.175	0.741	in	0.237	✓ Pass
Deflection Dead	2	0.018	0.494	in	0.037	✓ Pass
Deflection Live	2	0.090	0.494	in	0.183	✓ Pass
Deflection Post Composite	2	0.108	0.494	in	0.220	✓ Pass
Deflection Total	2	0.295	0.741	in	0.398	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-3.6	56.2	kip	0.064	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	13.4	63.7	kip ft	0.210	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Self weight	1	0.011	-	in	-	-
Deflection Total	1	0.252	0.741	in	0.340	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 7' 4 7/8" - Critical

Moment, M_x =13.4 kip ftElastic modulus of steel, E =29000 ksiMinimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 14' 9 7/8" - Critical

Position of V_{ry} =14' 9 7/8" ft, inRequired major axis shear strength, V_{ry} =-3.6 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.064



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 4 7/8" - Critical

Dist of M_{rx} along member =7' 4 7/8" ft, inRequired flexural strength, M_{rx1} =13.4 kip ft

Design flexural strength =63.7 kip ft AISC 360 F1, F2 and F3

Ratio =0.210



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =7' 4 7/8" ft, in

Max. Total load deflection =0.252 in

Span over limit =0.741 in

Design limit =0.741 in

Utilization Ratio =0.340



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 4 7/8" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w =29.900 h / t_w limit for plastic stress distribution =90.553



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Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 14' 9 7/8" - Critical

Position of V_y = 14' 9 7/8" ft, inRequired major axis shear strength, V_y = -9.3 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.166



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 4 7/8" Max Moment Position - Critical

Distance of M along member = 7' 4 7/8" ft, in

Required flexural strength, M_x = 34.5 kip ft

Design flexural strength = 107.0 kip ft

Ratio = 0.323



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 4 7/8" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4

Degree of shear connection = 0.262

Absolute minimum degree of shear connection = 0.250

Optimum amount of shear connection = 0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 372.0 in⁴Long term inertia, I_{al} = 372.0 in⁴Short term inertia @ partial interaction, I_{as} = 220.7 in⁴Long term inertia @ partial interaction, I_{al} = 220.7 in⁴

Position Total load deflection = 7' 4 7/8" ft, in

Deflection with full shear connection n , δ = 0.255 inDeflection of steel beam alone, δ_s = 0.549 in

Minimum degree of shear connection = 26.20 %

Deflection with partial shear connection, δ = 0.295 in

Span over limit = 0.741 in

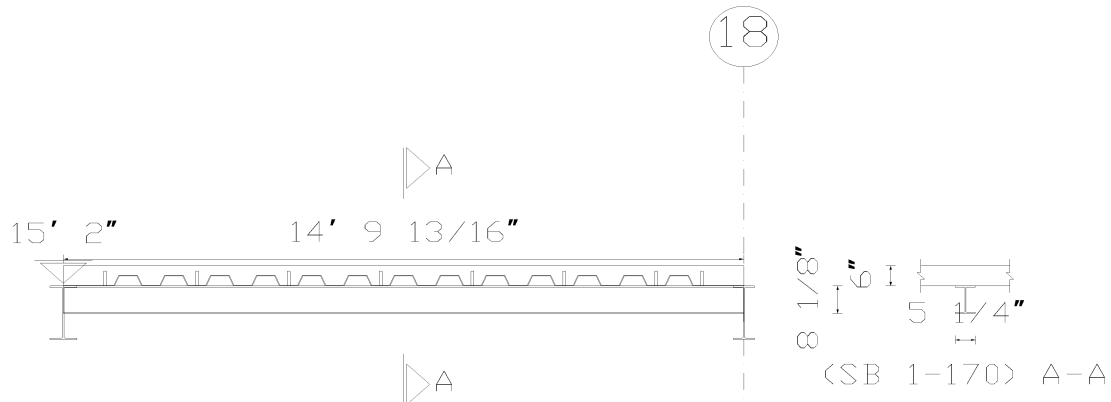
Design limit = 0.741 in

Utilization Ratio = 0.398



Pass

SB 1-170



Second Level: SB 1-170 - 1
W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	14' 9 3/4"	•	1.000		1.000		1.000		1.000
support	14' 9 3/4"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	11' 4 7/8"	6	1	2
12' 4 7/8"	14' 9 3/4"	2	1	1

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 3' 8 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.339	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-9.3	56.2	kip	0.166	✓ Pass
Flexure	2	34.5	107.0	kip ft	0.323	✓ Pass
Connector Resistance	2	4	8	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Self weight	2	0.011	-	in	-	-
Deflection Slab	2	0.175	0.741	in	0.237	✓ Pass
Deflection Dead	2	0.018	0.494	in	0.037	✓ Pass
Deflection Live	2	0.090	0.494	in	0.183	✓ Pass
Deflection Post Composite	2	0.108	0.494	in	0.219	✓ Pass
Deflection Total	2	0.295	0.741	in	0.398	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-3.6	56.2	kip	0.064	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	13.4	63.7	kip ft	0.210	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.011	-	in	-	-
Deflection Total	1	0.251	0.741	in	0.339	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 7' 4 7/8" - Critical

Moment, M_x = 13.4 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 14' 9 3/4" - Critical

Position of V_{ry} = 14' 9 3/4" ft, in

Required major axis shear strength, V_{ry} = -3.6 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.064



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 4 7/8" - Critical

Dist of M_{rx} along member = 7' 4 7/8" ft, in

Required flexural strength, M_{rx} = 13.4 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.210



Pass



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Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =7' 4 7/8" ft, in

Max. Total load deflection =0.251 in

Span over limit =0.741 in

Design limit =0.741 in

Utilization Ratio =0.339



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 4 7/8" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w =29.900h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 14' 9 3/4" - Critical

Position of V_{ry} =14' 9 3/4" ft, inRequired major axis shear strength, V_{ry} =-9.3 kip

Design shear strength =56.2 kip AISC 360 G2

Ratio =0.166



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 4 7/8" Max Moment Position - Critical

Distance of M along member =7' 4 7/8" ft, in

Required flexural strength, M_x =34.5 kip ft

Design flexural strength =107.0 kip ft

Ratio =0.323



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 4 7/8" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4

Degree of shear connection =0.262

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

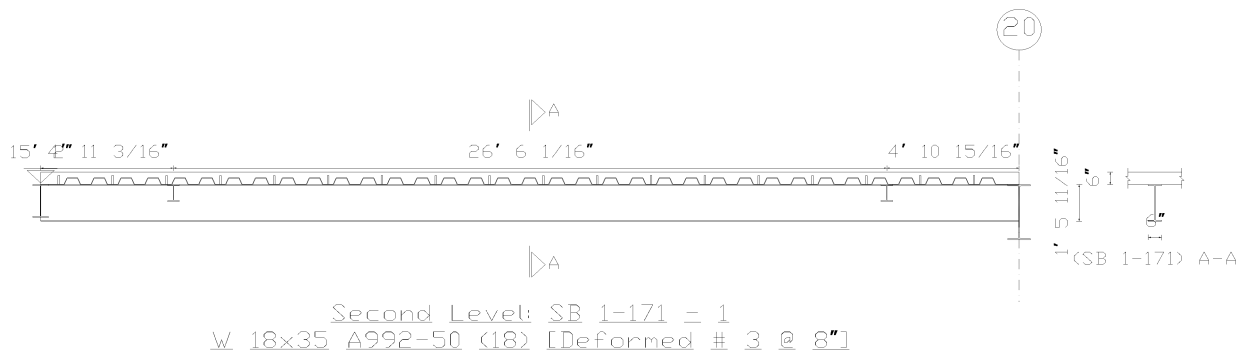
Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 372.0 in⁴
Long term inertia, I_{al} = 372.0 in⁴
Short term inertia @ partial interaction, I_{as} = 220.7 in⁴
Long term inertia @ partial interaction, I_{al} = 220.7 in⁴
Position Total load deflection = 7' 4 7/8" ft, in
Deflection with full shear connection n , δ = 0.255 in
Deflection of steel beam alone, δ_s = 0.549 in
Minimum degree of shear connection = 26.20 %
Deflection with partial shear connection, δ = 0.295 in
Span over limit = 0.741 in
Design limit = 0.741 in
Utilization Ratio = **0.398**

Pass

SB 1-171



Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 11 1/4"	•	1.000		1.000		1.000		1.000
member	4' 11 1/4"	•						•	
sub-beam	26' 6"	•	1.000		1.000		1.000		1.000
member	31' 5 1/4"	•						•	
sub-beam	4' 11"	•	1.000		1.000		1.000		1.000
support	36' 4 1/4"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	35' 2 1/8"	18	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 10 3/8" ft, in Normal 4.00 ksi



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Reinforcement

Transverse reinforcement

Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi

Reinforcement for crack control or fire requirements

Type Area Yield strength
6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 18x35 (18)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.627	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	23.3	159.3	kip	0.146	✓ Pass
Flexure	2	211.1	387.8	kip ft	0.544	✓ Pass
Connector Resistance	2	9	18	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.098	-	in	-	-
Deflection Slab	2	0.760	1.818	in	0.418	✓ Pass
Deflection Dead	2	0.112	1.212	in	0.092	✓ Pass
Deflection Live	2	0.559	1.212	in	0.461	✓ Pass
Deflection Post Composite	2	0.671	1.212	in	0.554	✓ Pass
Deflection Total	2	1.529	1.818	in	0.841	✓ Pass

Construction Stage

W 18x35(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	9.3	159.3	kip	0.058	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	83.9	249.4	kip ft	0.336	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.098	-	in	-	-
Deflection Total	1	1.139	1.818	in	0.627	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Flexural: Position 4' 11 1/4" - Critical

Moment, M_x =39.5 kip ft

Elastic modulus of steel, E =29000 ksi

Minimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in



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Required major axis shear strength, V_{ry} =9.3 kip

Design shear strength =159.3 kip AISC 360 G2

Ratio =0.058



Pass

Flexure Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Yielding: 18' 2 1/8" - Critical

Dist of M_{rx} along member =18' 2 1/8" ft, inRequired flexural strength, M_{rx1} =83.9 kip ft

Design flexural strength =249.4 kip ft AISC 360 F1, F2 and F3

Ratio =0.336



Pass

Deflection

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =18' 2 1/8" ft, in

Max. Total load deflection =1.139 in

Span over limit =1.818 in

Design limit =1.818 in

Utilization Ratio =0.627



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 18' 2" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w =53.500 h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =23.3 kip

Design shear strength =159.3 kip AISC 360 G2

Ratio =0.146



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2" Max Moment Position - Critical

Distance of M along member =18' 2" ft, in

Required flexural strength, M_x =211.1 kip ft

Design flexural strength =387.8 kip ft

Ratio =0.544



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 18

Number of shear connectors to critical point, N_a 9

Degree of shear connection = 0.301

Absolute minimum degree of shear connection = 0.250

Optimum amount of shear connection = 0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 1794.2 in⁴

Long term inertia, I_{al} = 1794.2 in⁴

Short term inertia @ partial interaction, I_{as} = 1214.7 in⁴

Long term inertia @ partial interaction, I_{al} = 1214.7 in⁴

Position Total load deflection = 18' 2 1/8" ft, in

Deflection with full shear connection n , δ = 1.318 in

Deflection of steel beam alone, δ_s = 2.429 in

Minimum degree of shear connection = 30.11 %

Deflection with partial shear connection, δ = 1.529 in

Span over limit = 1.818 in

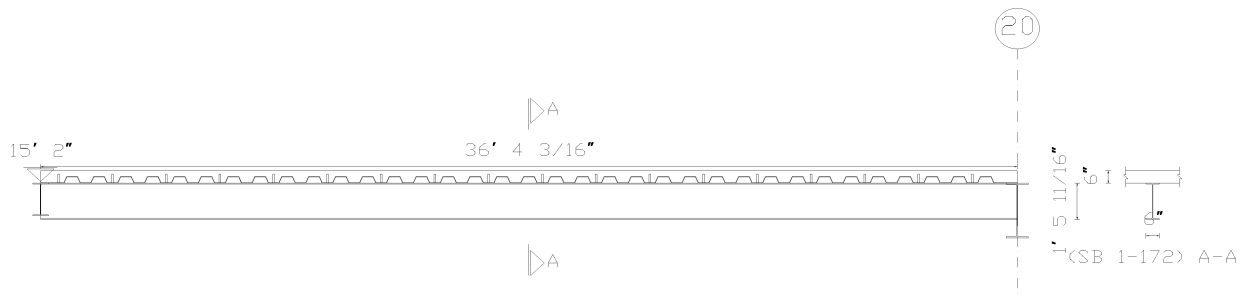
Design limit = 1.818 in

Utilization Ratio = 0.841



Pass

SB 1-172



Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	36' 4 1/8"	•	1.000		1.000		1.000		1.000
support	36' 4 1/8"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength



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AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	35' 2 1/8"	18	1	2

Decking

Manufacturer Name Gauge Yield strength
 VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
 6" ft, in 4' 10 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
 Type Area Yield strength Type Area Yield strength
 Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 18x35 (18)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.625	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-23.2	159.3	kip	0.146	✓ Pass
Flexure	2	211.1	387.9	kip ft	0.544	✓ Pass
Connector Resistance	2	9	18	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.094	-	in	-	-
Deflection Slab	2	0.760	1.817	in	0.418	✓ Pass
Deflection Dead	2	0.112	1.212	in	0.092	✓ Pass
Deflection Live	2	0.560	1.212	in	0.462	✓ Pass
Deflection Post Composite	2	0.671	1.212	in	0.554	✓ Pass
Deflection Total	2	1.526	1.817	in	0.840	✓ Pass

Construction Stage

W 18x35(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-9.2	159.3	kip	0.058	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	83.8	249.4	kip ft	0.336	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.094	-	in	-	-
Deflection Total	1	1.137	1.817	in	0.625	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical



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Flexural: Position 18' 2 1/8" - Critical

Moment, M_x =83.8 kip ftElastic modulus of steel, E =29000 ksiMinimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Position 36' 4 1/8" - Critical

Position of V_{ry} =36' 4 1/8" ft, inRequired major axis shear strength, V_{ry} =-9.2 kip

Design shear strength =159.3 kip AISC 360 G2

Ratio =0.058



Pass

Flexure Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Yielding: 18' 2 1/8" - Critical

Dist of M_{rx} along member =18' 2 1/8" ft, inRequired flexural strength, M_{rx1} =83.8 kip ft

Design flexural strength =249.4 kip ft AISC 360 F1, F2 and F3

Ratio =0.336



Pass

Deflection

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =18' 2 1/8" ft, in

Max. Total load deflection =1.137 in

Span over limit =1.817 in

Design limit =1.817 in

Utilization Ratio =0.625



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 18' 2 1/8" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w =53.500 h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 36' 4 1/8" - Critical

Position of V_{ry} =36' 4 1/8" ft, inRequired major axis shear strength, V_{ry} =-23.2 kip

Design shear strength =159.3 kip AISC 360 G2

Ratio =0.146



Pass



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Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2 1/8" Max Moment Position - Critical

Distance of M along member = 18' 2 1/8" ft, in

Required flexural strength, M_x = 211.1 kip ft

Design flexural strength = 387.9 kip ft

Ratio = **0.544**

Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2 1/8" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 18

Number of shear connectors to critical point, N_a 9Degree of shear connection = **0.301**Absolute minimum degree of shear connection = **0.250**Optimum amount of shear connection = **0.500**

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 1795.1 in⁴Long term inertia, I_{aL} = 1795.1 in⁴Short term inertia @ partial interaction, I_{as} = 1215.2 in⁴Long term inertia @ partial interaction, I_{aL} = 1215.2 in⁴

Position Total load deflection = 18' 2 1/8" ft, in

Deflection with full shear connection n , δ = 1.316 inDeflection of steel beam alone, δ_s = 2.428 in

Minimum degree of shear connection = 30.11 %

Deflection with partial shear connection, δ = 1.526 in

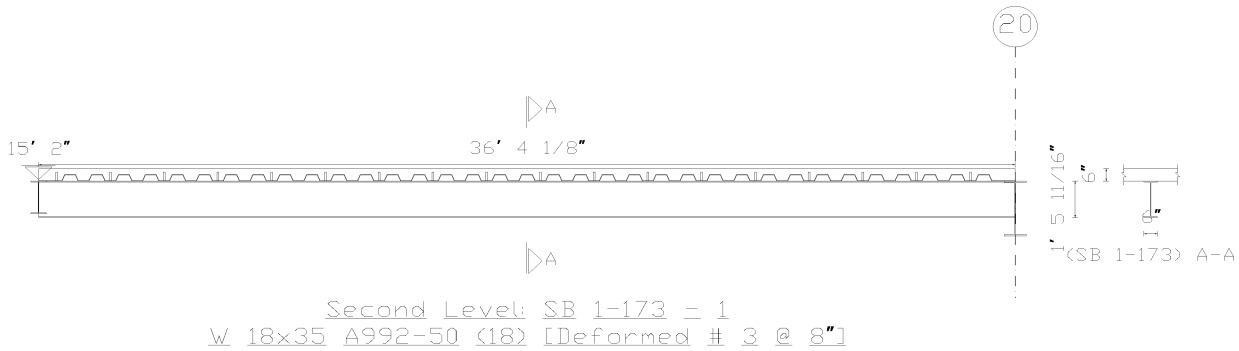
Span over limit = 1.817 in

Design limit = 1.817 in

Utilization Ratio = **0.840**

Pass

SB 1-173



Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	36' 4 1/8"	•	1.000		1.000		1.000		1.000
support	36' 4 1/8"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	35' 2 1/8"	18	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f'_c
6" ft, in 4' 10 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 18x35 (18)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.625	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-23.2	159.3	kip	0.146	✓ Pass
Flexure	2	211.1	387.9	kip ft	0.544	✓ Pass
Connector Resistance	2	9	18	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.094	-	in	-	-
Deflection Slab	2	0.760	1.817	in	0.418	✓ Pass
Deflection Dead	2	0.112	1.211	in	0.092	✓ Pass
Deflection Live	2	0.559	1.211	in	0.462	✓ Pass
Deflection Post Composite	2	0.671	1.211	in	0.554	✓ Pass
Deflection Total	2	1.526	1.817	in	0.840	✓ Pass



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Construction Stage

W 18x35(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-9.2	159.3	kip	0.058	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	83.8	249.4	kip ft	0.336	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.094	-	in	-	-
Deflection Total	1	1.136	1.817	in	0.625	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Flexural: Position 18' 2 1/8" - Critical

Moment, M_x = 83.8 kip ftElastic modulus of steel, E = 29000 ksiMinimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Position 36' 4 1/8" - Critical

Position of V_{ry} = 36' 4 1/8" ft, inRequired major axis shear strength, V_{ry} = -9.2 kip

Design shear strength = 159.3 kip AISC 360 G2

Ratio = 0.058



Pass

Flexure Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Yielding: 18' 2 1/8" - Critical

Dist of M_{rx} along member = 18' 2 1/8" ft, inRequired flexural strength, M_{rx1} = 83.8 kip ft

Design flexural strength = 249.4 kip ft AISC 360 F1, F2 and F3

Ratio = 0.336



Pass

Deflection

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 18' 2 1/8" ft, in

Max. Total load deflection = 1.136 in

Span over limit = 1.817 in



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Design limit =1.817 in

Utilization Ratio =0.625



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 18' 2 1/8" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w =53.500h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 36' 4 1/8" - Critical

Position of V_{ry} =36' 4 1/8" ft, inRequired major axis shear strength, V_{ry} =-23.2 kip

Design shear strength =159.3 kip AISC 360 G2

Ratio =0.146



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2 1/8" Max Moment Position - Critical

Distance of M along member =18' 2 1/8" ft, in

Required flexural strength, M_x =211.1 kip ft

Design flexural strength =387.9 kip ft

Ratio =0.544



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2 1/8" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 18

Number of shear connectors to critical point, N_a 9

Degree of shear connection =0.301

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

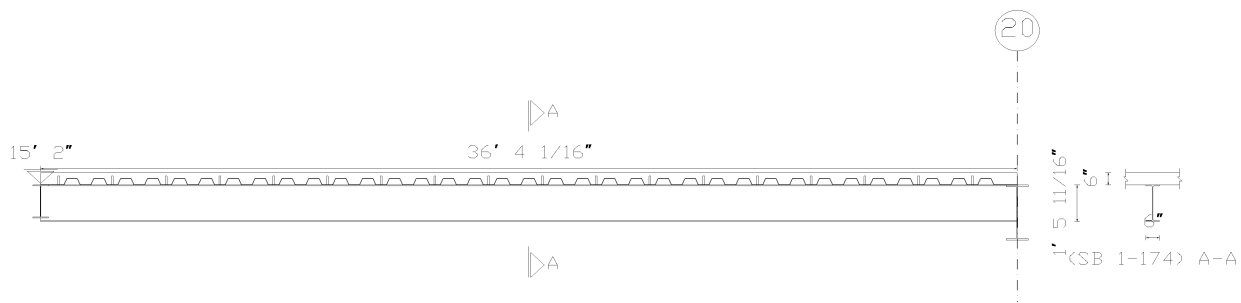
Deflection Total - Critical

Short term inertia, I_{as} =1795.1 in⁴Long term inertia, I_{atL} =1795.1 in⁴Short term inertia @ partial interaction, I_{as} =1215.2 in⁴Long term inertia @ partial interaction, I_{atL} =1215.2 in⁴

Position Total load deflection =18' 2 1/8" ft, in
Deflection with full shear connection δ =1.315 in
Deflection of steel beam alone, δ_s =2.427 in
Minimum degree of shear connection =30.11 %
Deflection with partial shear connection, δ =1.526 in
Span over limit =1.817 in
Design limit =1.817 in
Utilization Ratio =0.840

✓ Pass

SB 1-174



Second Level: SB 1-174 = 1
W 18x35 A992-50 (18) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	36' 4 1/8"	•	1.000	•	1.000	•	1.000	•	1.000
support	36' 4 1/8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength

AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	35' 2"	18	1	2

Decking

Manufacturer Name Gauge Yield strength

VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'

6" ft, in 4' 10 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement

Reinforcement for crack control or fire requirements

Type Area Yield strength Type Area Yield strength

Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 18x35 (18)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.625	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-23.2	159.3	kip	0.146	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Flexure	2	211.0	387.9	kip ft	0.544	✓ Pass
Connector Resistance	2	9	18	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.094	-	in	-	-
Deflection Slab	2	0.760	1.817	in	0.418	✓ Pass
Deflection Dead	2	0.112	1.211	in	0.092	✓ Pass
Deflection Live	2	0.559	1.211	in	0.462	✓ Pass
Deflection Post Composite	2	0.671	1.211	in	0.554	✓ Pass
Deflection Total	2	1.525	1.817	in	0.839	✓ Pass

Construction Stage

W 18x35(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-9.2	159.3	kip	0.058	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	83.7	249.4	kip ft	0.336	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.094	-	in	-	-
Deflection Total	1	1.136	1.817	in	0.625	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Flexural: Position 18' 2" - Critical

Moment, M_x = 83.7 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Position 36' 4 1/8" - Critical

Position of V_{ry} = 36' 4 1/8" ft, in

Required major axis shear strength, V_{ry} = -9.2 kip

Design shear strength = 159.3 kip AISC 360 G2

Ratio = 0.058

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Yielding: 18' 2" - Critical

Dist of M_{rx} along member = 18' 2" ft, in



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Required flexural strength, M_{rx1} =83.7 kip ft
Design flexural strength =249.4 kip ft AISC 360 F1, F2 and F3
Ratio =0.336



Pass

Deflection

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =18' 2" ft, in
Max. Total load deflection =1.136 in
Span over limit =1.817 in
Design limit =1.817 in
Utilization Ratio =0.625



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 18' 2" - Critical

Web class Compact AISC 360 Table B4.1b
 h / t_w =53.500
 h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 36' 4 1/8" - Critical

Position of V_{ry} =36' 4 1/8" ft, in
Required major axis shear strength, V_{ry} =-23.2 kip
Design shear strength =159.3 kip AISC 360 G2
Ratio =0.146



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2" Max Moment Position - Critical

Distance of M along member =18' 2" ft, in
Required flexural strength, M_x =211.0 kip ft
Design flexural strength =387.9 kip ft
Ratio =0.544



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2" Max Moment and UR Position - Critical

Layout and strength of shear connectors
Maximum group spacing, s =2' 0" ft, in
Maximum permitted group spacing =3' 0" ft, in
Number of shear connectors over full beam length 18
Number of shear connectors to critical point, N_a 9
Degree of shear connection =0.301
Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection

Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} =1795.1 in⁴

Long term inertia, I_{al} =1795.1 in⁴

Short term inertia @ partial interaction, I_{as} =1215.2 in⁴

Long term inertia @ partial interaction, I_{al} =1215.2 in⁴

Position Total load deflection =18' 2" ft, in

Deflection with full shear connection n, δ =1.315 in

Deflection of steel beam alone, δ_s =2.426 in

Minimum degree of shear connection =30.11 %

Deflection with partial shear connection, δ =1.525 in

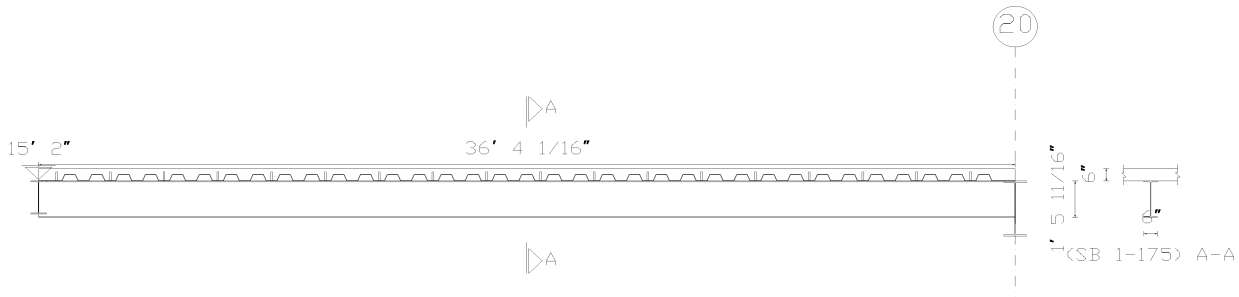
Span over limit =1.817 in

Design limit =1.817 in

Utilization Ratio =0.839

Pass

SB 1-175



Second Level: SB 1-175 = 1
 W 18x35 A992-50 (18) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	36' 4"	•	1.000		1.000		1.000		1.000
support	36' 4"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength
 AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	35' 2"	18	1	2

Decking

Manufacturer Name Gauge Yield strength
 VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
 6" ft, in 4' 10 1/2" ft, in Normal 4.00 ksi



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Reinforcement

Transverse reinforcement

Reinforcement for crack control or fire requirements

Type	Area	Yield strength	Type	Area	Yield strength
Deformed # 3 @ 8"	0.17 in ² /ft	60.00 ksi	6x6 W1.4xW1.4	0.03 in ² /ft	65.00 ksi

Static Design Summary

Summary W 18x35 (18)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.626	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-23.3	159.3	kip	0.146	✓ Pass
Flexure	2	211.3	387.9	kip ft	0.545	✓ Pass
Connector Resistance	2	9	18	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.094	-	in	-	-
Deflection Slab	2	0.761	1.817	in	0.419	✓ Pass
Deflection Dead	2	0.112	1.211	in	0.092	✓ Pass
Deflection Live	2	0.560	1.211	in	0.462	✓ Pass
Deflection Post Composite	2	0.672	1.211	in	0.554	✓ Pass
Deflection Total	2	1.526	1.817	in	0.840	✓ Pass

Construction Stage

W 18x35(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	-9.2	159.3	kip	0.058	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	83.8	249.4	kip ft	0.336	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.094	-	in	-	-
Deflection Total	1	1.137	1.817	in	0.626	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Flexural: Position 18' 2" - Critical

Moment, M_x = 83.8 kip ftElastic modulus of steel, E = 29000 ksiMinimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Position 36' 4" - Critical

Position of V_{ry} = 36' 4" ft, in



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Required major axis shear strength, V_{ry} = -9.2 kip

Design shear strength = 159.3 kip AISC 360 G2

Ratio = 0.058



Pass

Flexure Major

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Yielding: 18' 2 1/8" - Critical

Dist of M_{rx} along member = 18' 2 1/8" ft, inRequired flexural strength, M_{rx1} = 83.8 kip ft

Design flexural strength = 249.4 kip ft AISC 360 F1, F2 and F3

Ratio = 0.336



Pass

Deflection

1 Construction Stage

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 18' 2" ft, in

Max. Total load deflection = 1.137 in

Span over limit = 1.817 in

Design limit = 1.817 in

Utilization Ratio = 0.626



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 18' 2 1/8" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w = 53.500 h / t_w limit for plastic stress distribution = 90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Position 36' 4" - Critical

Position of V_{ry} = 36' 4" ft, inRequired major axis shear strength, V_{ry} = -23.3 kip

Design shear strength = 159.3 kip AISC 360 G2

Ratio = 0.146



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2 1/8" Max Moment Position - Critical

Distance of M along member = 18' 2 1/8" ft, in

Required flexural strength, M_x = 211.3 kip ft

Design flexural strength = 387.9 kip ft

Ratio = 0.545



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

18' 2 1/8" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 18

Number of shear connectors to critical point, N_a 9

Degree of shear connection = 0.301

Absolute minimum degree of shear connection = 0.250

Optimum amount of shear connection = 0.500

Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 18x35 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 1795.1 in⁴

Long term inertia, I_{aL} = 1795.1 in⁴

Short term inertia @ partial interaction, I_{as} = 1215.2 in⁴

Long term inertia @ partial interaction, I_{aL} = 1215.2 in⁴

Position Total load deflection = 18' 2" ft, in

Deflection with full shear connection n , δ = 1.316 in

Deflection of steel beam alone, δ_s = 2.428 in

Minimum degree of shear connection = 30.11 %

Deflection with partial shear connection, δ = 1.526 in

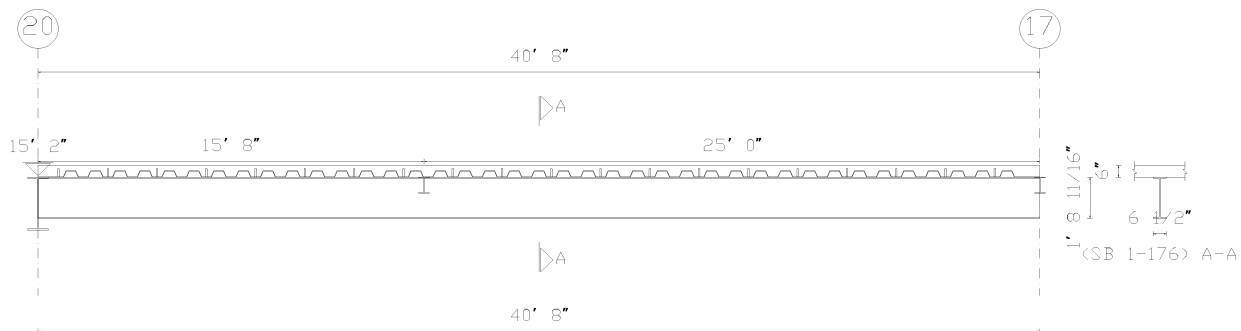
Span over limit = 1.817 in

Design limit = 1.817 in

Utilization Ratio = 0.840

✓ Pass

SB 1-176



Second Level: SB 1-176 = 1 (W 21x44 A992-50 (20) [Deformed # 3 @ 8"])

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	15' 8"	•	1.000		1.000		1.000		1.000
member	15' 8"	•						•	
sub-beam	25' 0"	•	1.000		1.000		1.000		1.000
support	40' 8"	•		•		•		•	



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Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	39' 4"	20	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f'_c
6" ft, in 4' 10 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 21x44 (20)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.543	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	26.3	217.4	kip	0.121	✓ Pass
Flexure	2	267.0	533.0	kip ft	0.501	✓ Pass
Connector Resistance	2	8	20	-	-	⚠ Warning
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.117	-	in	-	-
Deflection Slab	2	0.721	2.033	in	0.354	✓ Pass
Deflection Dead	2	0.116	1.356	in	0.085	✓ Pass
Deflection Live	2	0.578	1.356	in	0.427	✓ Pass
Deflection Post Composite	2	0.694	1.356	in	0.512	✓ Pass
Deflection Total	2	1.531	2.033	in	0.753	✓ Pass

Construction Stage

W 21x44(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	10.6	217.4	kip	0.049	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	107.5	357.7	kip ft	0.301	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.117	-	in	-	-
Deflection Total	1	1.104	2.033	in	0.543	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification



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1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Flexural: Position 15' 8" - Critical

Moment, M_x =102.0 kip ftElastic modulus of steel, E =29000 ksiMinimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =10.6 kip

Design shear strength =217.4 kip AISC 360 G2

Ratio =0.049



Pass

Flexure Major

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Yielding: 20' 3 1/2" - Critical

Dist of M_{rx} along member =20' 3 1/2" ft, inRequired flexural strength, M_{rx1} =107.5 kip ft

Design flexural strength =357.7 kip ft AISC 360 F1, F2 and F3

Ratio =0.301



Pass

Deflection

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =20' 3 7/8" ft, in

Max. Total load deflection =1.104 in

Span over limit =2.033 in

Design limit =2.033 in

Utilization Ratio =0.543



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

Position 20' 3 7/8" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w =53.600 h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =26.3 kip

Design shear strength =217.4 kip AISC 360 G2



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Ratio **=0.121**

Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

20' 3 7/8" Max Moment Position - Critical

Distance of M along member =20' 3 7/8" ft, in

Required flexural strength, M_x =267.0 kip ft

Design flexural strength =533.0 kip ft

Ratio **=0.501**

Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

15' 8" Max UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 20

Number of shear connectors to critical point, N_a 8Degree of shear connection **=0.231**Absolute minimum degree of shear connection **=0.250**Optimum amount of shear connection **=0.500**

Partial shear connection

Warning

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} =2691.7 in⁴Long term inertia, I_{aL} =2691.7 in⁴Short term inertia @ partial interaction, I_{as} =1836.4 in⁴Long term inertia @ partial interaction, I_{aL} =1836.4 in⁴

Position Total load deflection =20' 4" ft, in

Deflection with full shear connection n , δ =1.317 inDeflection of steel beam alone, δ_s =2.328 in

Minimum degree of shear connection =28.87 %

Deflection with partial shear connection, δ =1.531 in

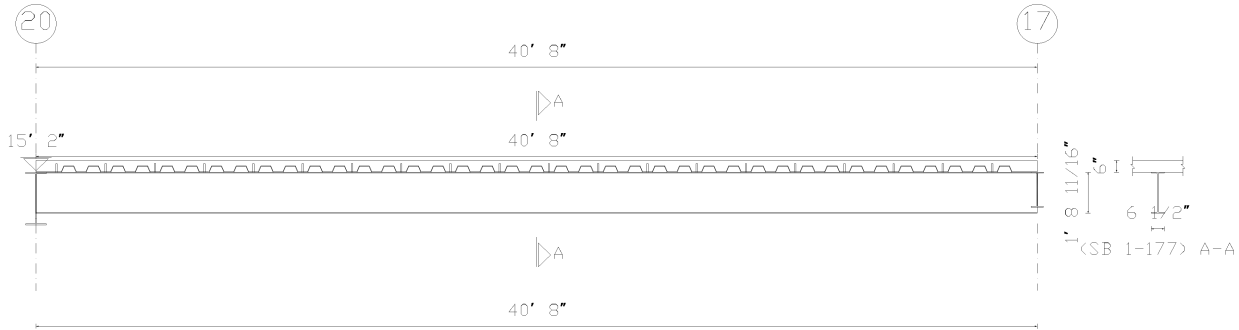
Span over limit =2.033 in

Design limit =2.033 in

Utilization Ratio **=0.753**

Pass

SB 1-177



Second Level: SB 1-177 = 1 (W 21x44 A992-50 (20) [Deformed # 3 @ 8"])

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	40' 8"	•	1.000	•	1.000	•	1.000	•	1.000
support	40' 8"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	39' 4"	20	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 10 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 21x44 (20)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.541	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	26.2	217.4	kip	0.121	✓ Pass
Flexure	2	266.6	533.0	kip ft	0.500	✓ Pass
Connector Resistance	2	10	20	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.113	-	in	-	-
Deflection Slab	2	0.721	2.033	in	0.354	✓ Pass
Deflection Dead	2	0.116	1.356	in	0.085	✓ Pass
Deflection Live	2	0.578	1.356	in	0.427	✓ Pass
Deflection Post Composite	2	0.694	1.356	in	0.512	✓ Pass



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Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Total	2	1.527	2.033	in	0.751	✓ Pass

Construction Stage

W 21x44(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	10.5	217.4	kip	0.048	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	107.1	357.7	kip ft	0.299	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.113	-	in	-	-
Deflection Total	1	1.100	2.033	in	0.541	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Flexural: Position 20' 4" - Critical

Moment, M_x = 107.1 kip ftElastic modulus of steel, E = 29000 ksiMinimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 10.5 kip

Design shear strength = 217.4 kip AISC 360 G2

Ratio = 0.048

✓ Pass

Flexure Major

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Yielding: 20' 4" - Critical

Dist of M_{rx} along member = 20' 4" ft, inRequired flexural strength, M_{rx1} = 107.1 kip ft

Design flexural strength = 357.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.299

✓ Pass

Deflection

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 20' 4" ft, in



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Max. Total load deflection =1.100 in
Span over limit =2.033 in
Design limit =2.033 in
Utilization Ratio =0.541



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

Position 20' 4" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w =53.600h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, inRequired major axis shear strength, V_{ry} =26.2 kip

Design shear strength =217.4 kip AISC 360 G2

Ratio =0.121



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

20' 4" Max Moment Position - Critical

Distance of M along member =20' 4" ft, in

Required flexural strength, M_x =266.6 kip ft

Design flexural strength =533.0 kip ft

Ratio =0.500



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

20' 4" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 20

Number of shear connectors to critical point, N_a 10

Degree of shear connection =0.289

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

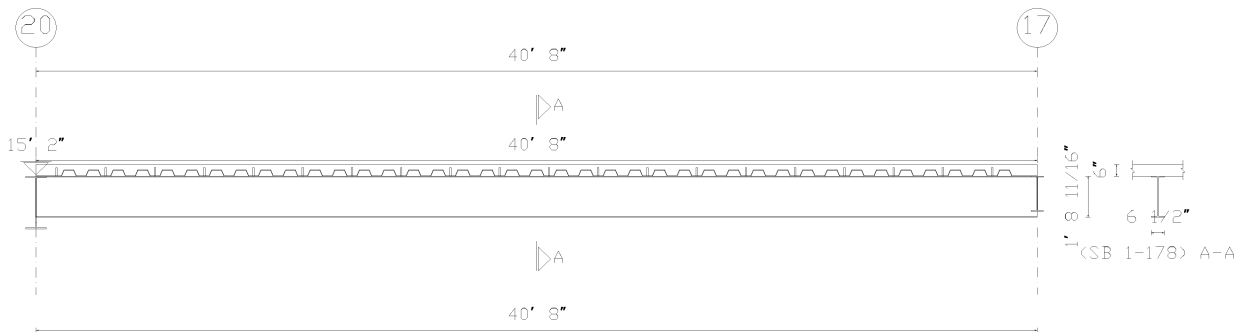
Deflection Total - Critical

Short term inertia, I_{as} =2691.7 in⁴Long term inertia, I_{at} =2691.7 in⁴

Short term inertia @ partial interaction, I_{as} =1836.4 in⁴
Long term inertia @ partial interaction, I_{al} =1836.4 in⁴
Position Total load deflection =20' 4" ft, in
Deflection with full shear connection n , δ =1.312 in
Deflection of steel beam alone, δ_s =2.324 in
Minimum degree of shear connection =28.87 %
Deflection with partial shear connection, δ =1.527 in
Span over limit =2.033 in
Design limit =2.033 in
Utilization Ratio =0.751

✓ Pass

SB 1-178



Second Level: SB 1-178 = 1 (W 21x44 A992-50 (20) [Deformed # 3 @ 8"])

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	40' 8"	•	1.000	•	1.000	•	1.000	•	1.000
support	40' 8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	39' 4"	20	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 4' 10 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 21x44 (20)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.541	✓ Pass

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	26.2	217.4	kip	0.121	✓ Pass
Flexure	2	266.6	533.0	kip ft	0.500	✓ Pass
Connector Resistance	2	10	20		-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.113	-	in	-	-
Deflection Slab	2	0.721	2.033	in	0.354	✓ Pass
Deflection Dead	2	0.116	1.356	in	0.085	✓ Pass
Deflection Live	2	0.578	1.356	in	0.427	✓ Pass
Deflection Post Composite	2	0.694	1.356	in	0.512	✓ Pass
Deflection Total	2	1.527	2.033	in	0.751	✓ Pass

Construction Stage

W 21x44(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	10.5	217.4	kip	0.048	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	107.1	357.7	kip ft	0.299	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.113	-	in	-	-
Deflection Total	1	1.100	2.033	in	0.541	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Flexural: Position 20' 4" - Critical

Moment, M_x =107.1 kip ft

Elastic modulus of steel, E =29000 ksi

Minimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in

Required major axis shear strength, V_{ry} =10.5 kip

Design shear strength =217.4 kip AISC 360 G2

Ratio =0.048



Pass

Flexure Major

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical



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Yielding: 20' 4" - Critical

Dist of M_{rx} along member = 20' 4" ft, inRequired flexural strength, M_{rx1} = 107.1 kip ft

Design flexural strength = 357.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.299



Pass

Deflection

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 20' 4" ft, in

Max. Total load deflection = 1.100 in

Span over limit = 2.033 in

Design limit = 2.033 in

Utilization Ratio = 0.541



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

Position 20' 4" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w = 53.600 h / t_w limit for plastic stress distribution = 90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 26.2 kip

Design shear strength = 217.4 kip AISC 360 G2

Ratio = 0.121



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

20' 4" Max Moment Position - Critical

Distance of M along member = 20' 4" ft, in

Required flexural strength, M_x = 266.6 kip ft

Design flexural strength = 533.0 kip ft

Ratio = 0.500



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

20' 4" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 20

Number of shear connectors to critical point, N_a 10

Degree of shear connection = **0.289**
Absolute minimum degree of shear connection = **0.250**
Optimum amount of shear connection = **0.500**
Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

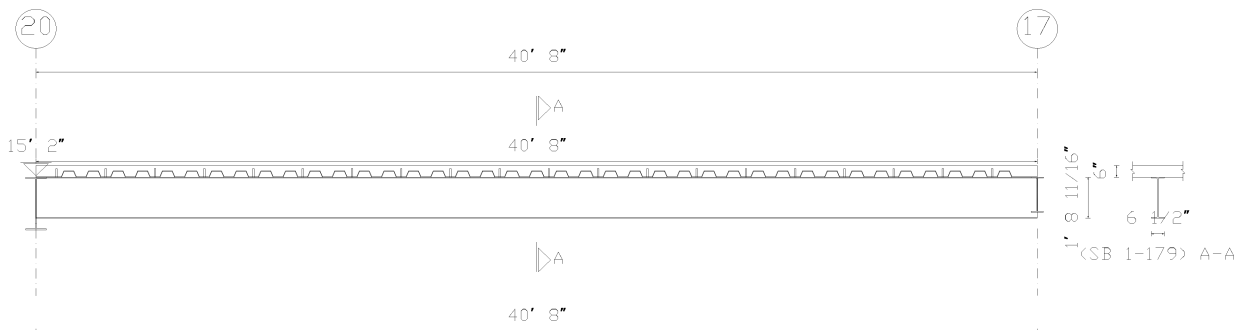
Span 1 W 21x44 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 2691.7 in⁴
Long term inertia, I_{aL} = 2691.7 in⁴
Short term inertia @ partial interaction, I_{as} = 1836.4 in⁴
Long term inertia @ partial interaction, I_{aL} = 1836.4 in⁴
Position Total load deflection = 20' 4" ft, in
Deflection with full shear connection n, δ = 1.312 in
Deflection of steel beam alone, δ_s = 2.324 in
Minimum degree of shear connection = 28.87 %
Deflection with partial shear connection, δ = 1.527 in
Span over limit = 2.033 in
Design limit = 2.033 in
Utilization Ratio = **0.751**

✓ Pass

SB 1-179



Second Level: SB 1-179 = 1 (W 21x44 A992-50 (20) [Deformed # 3 @ 8"])

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	40' 8"	•	1.000		1.000		1.000		1.000
support	40' 8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	39' 4"	20	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi



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Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
 6" ft, in 4' 10 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
 Type Area Yield strength Type Area Yield strength
 Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 21x44 (20)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.541	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-26.2	217.4	kip	0.121	✓ Pass
Flexure	2	266.6	533.0	kip ft	0.500	✓ Pass
Connector Resistance	2	10	20	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.113	-	in	-	-
Deflection Slab	2	0.721	2.033	in	0.354	✓ Pass
Deflection Dead	2	0.116	1.356	in	0.085	✓ Pass
Deflection Live	2	0.578	1.356	in	0.427	✓ Pass
Deflection Post Composite	2	0.694	1.356	in	0.512	✓ Pass
Deflection Total	2	1.527	2.033	in	0.751	✓ Pass

Construction Stage

W 21x44(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	10.5	217.4	kip	0.048	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	107.1	357.7	kip ft	0.299	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.113	-	in	-	-
Deflection Total	1	1.100	2.033	in	0.541	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Flexural: Position 20' 4" - Critical

Moment, M_x =107.1 kip ftElastic modulus of steel, E =29000 ksiMinimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical



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Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 10.5 kip

Design shear strength = 217.4 kip AISC 360 G2

Ratio = 0.048



Pass

Flexure Major

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Yielding: 20' 4" - Critical

Dist of M_{rx} along member = 20' 4" ft, inRequired flexural strength, M_{rx1} = 107.1 kip ft

Design flexural strength = 357.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.299



Pass

Deflection

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 20' 4" ft, in

Max. Total load deflection = 1.100 in

Span over limit = 2.033 in

Design limit = 2.033 in

Utilization Ratio = 0.541



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

Position 20' 4" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w = 53.600 h / t_w limit for plastic stress distribution = 90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

Position 40' 8" - Critical

Position of V_{ry} = 40' 8" ft, inRequired major axis shear strength, V_{ry} = 26.2 kip

Design shear strength = 217.4 kip AISC 360 G2

Ratio = 0.121



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

20' 4" Max Moment Position - Critical

Distance of M along member = 20' 4" ft, in

Required flexural strength, M_x = 266.6 kip ft

Design flexural strength = 533.0 kip ft

Ratio = 0.500

✓ Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

20' 4" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s = 2' 0" ft, in

Maximum permitted group spacing = 3' 0" ft, in

Number of shear connectors over full beam length 20

Number of shear connectors to critical point, N_a 10

Degree of shear connection = 0.289

Absolute minimum degree of shear connection = 0.250

Optimum amount of shear connection = 0.500

Partial shear connection

✓ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{st} = 2691.7 in⁴

Long term inertia, I_{sl} = 2691.7 in⁴

Short term inertia @ partial interaction, I_{st} = 1836.4 in⁴

Long term inertia @ partial interaction, I_{sl} = 1836.4 in⁴

Position Total load deflection = 20' 4" ft, in

Deflection with full shear connection n , δ = 1.312 in

Deflection of steel beam alone, δ_s = 2.324 in

Minimum degree of shear connection = 28.87 %

Deflection with partial shear connection, δ = 1.527 in

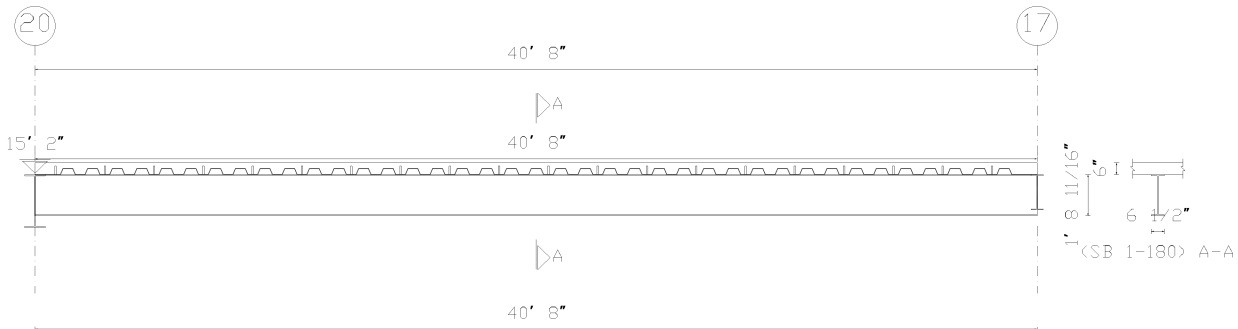
Span over limit = 2.033 in

Design limit = 2.033 in

Utilization Ratio = 0.751

✓ Pass

SB 1-180



Second Level: SB 1-180 = 1 (W 21x44 A992-50 (20) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	40' 8"	•	1.000		1.000		1.000		1.000

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	40' 8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	39' 4"	20	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f'_c
6" ft, in 4' 10 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 21x44 (20)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.541	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	26.2	217.4	kip	0.121	✓ Pass
Flexure	2	266.6	533.0	kip ft	0.500	✓ Pass
Connector Resistance	2	10	20	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.113	-	in	-	-
Deflection Slab	2	0.721	2.033	in	0.354	✓ Pass
Deflection Dead	2	0.116	1.356	in	0.085	✓ Pass
Deflection Live	2	0.578	1.356	in	0.427	✓ Pass
Deflection Post Composite	2	0.694	1.356	in	0.512	✓ Pass
Deflection Total	2	1.527	2.033	in	0.751	✓ Pass

Construction Stage

W 21x44(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	10.5	217.4	kip	0.048	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	107.1	357.7	kip ft	0.299	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.113	-	in	-	-
Deflection Total	1	1.100	2.033	in	0.541	✓ Pass



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Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Flexural: Position 15' 8" - Critical

Moment, M_x =101.5 kip ft

Elastic modulus of steel, E =29000 ksi

Minimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} =0" ft, in

Required major axis shear strength, V_{ry} =10.5 kip

Design shear strength =217.4 kip AISC 360 G2

Ratio =0.048



Pass

Flexure Major

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Yielding: 20' 4" - Critical

Dist of M_{rx} along member =20' 4" ft, in

Required flexural strength, M_{rx1} =107.1 kip ft

Design flexural strength =357.7 kip ft AISC 360 F1, F2 and F3

Ratio =0.299



Pass

Deflection

1 Construction Stage

Span 1 W 21x44 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =20' 4" ft, in

Max. Total load deflection =1.100 in

Span over limit =2.033 in

Design limit =2.033 in

Utilization Ratio =0.541



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

Position 20' 4" - Critical

Web class Compact AISC 360 Table B4.1b

h / t_w =53.600

h / t_w limit for plastic stress distribution =90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical



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Position 0" - Critical

Position of V_{ry} = 0" ft, in
Required major axis shear strength, V_{ry} = 26.2 kip
Design shear strength = 217.4 kip AISC 360 G2
Ratio = **0.121**

✔ Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

20' 4" Max Moment Position - Critical

Distance of M along member = 20' 4" ft, in
Required flexural strength, M_x = 266.6 kip ft
Design flexural strength = 533.0 kip ft
Ratio = **0.500**

✔ Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 21x44 A992-50 - Critical

20' 4" Max Moment and UR Position - Critical

Layout and strength of shear connectors
Maximum group spacing, s = 2' 0" ft, in
Maximum permitted group spacing = 3' 0" ft, in
Number of shear connectors over full beam length 20
Number of shear connectors to critical point, N_a 10
Degree of shear connection = **0.289**
Absolute minimum degree of shear connection = **0.250**
Optimum amount of shear connection = **0.500**
Partial shear connection

✔ Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

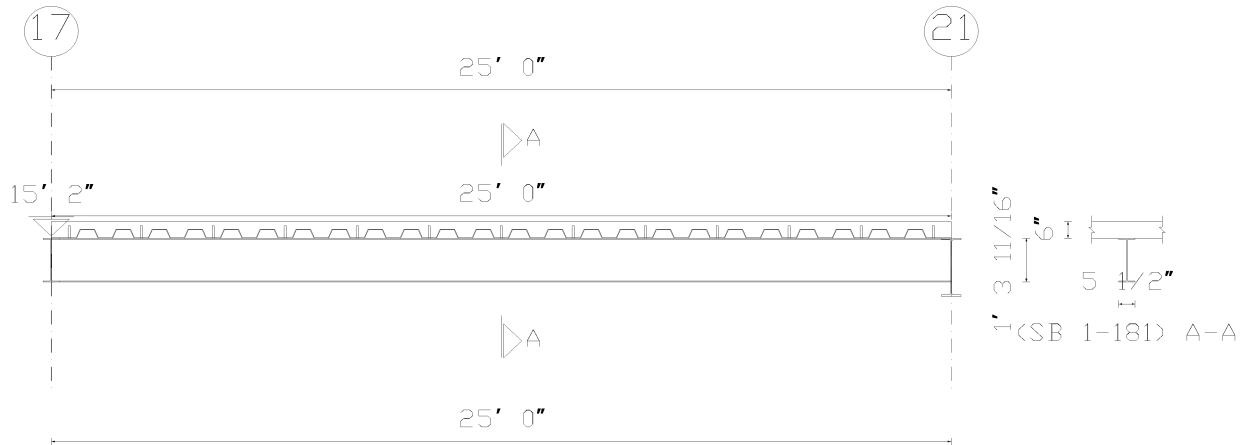
Span 1 W 21x44 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} = 2691.7 in⁴
Long term inertia, I_{aL} = 2691.7 in⁴
Short term inertia @ partial interaction, I_{as} = 1836.4 in⁴
Long term inertia @ partial interaction, I_{aL} = 1836.4 in⁴
Position Total load deflection = 20' 4" ft, in
Deflection with full shear connection n , δ = 1.312 in
Deflection of steel beam alone, δ_s = 2.324 in
Minimum degree of shear connection = 28.87 %
Deflection with partial shear connection, δ = 1.527 in
Span over limit = 2.033 in
Design limit = 2.033 in
Utilization Ratio = **0.751**

✔ Pass

SB 1-181



Second Level: SB 1-181 = 1
W 16x26 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	25' 0"	•	1.000		1.000		1.000		1.000
support	25' 0"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	25' 0"	13	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 5' 2 7/8" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 16x26 (13)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.364	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-17.0	106.0	kip	0.160	✓ Pass
Flexure	2	106.1	255.4	kip ft	0.416	✓ Pass
Connector Resistance	2	6	13	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.027	-	in	-	-

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Slab	2	0.312	1.250	in	0.250	✓ Pass
Deflection Dead	2	0.043	0.833	in	0.052	✓ Pass
Deflection Live	2	0.216	0.833	in	0.259	✓ Pass
Deflection Post Composite	2	0.259	0.833	in	0.311	✓ Pass
Deflection Total	2	0.598	1.250	in	0.479	✓ Pass

Construction Stage

W 16x26(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	6.6	106.0	kip	0.063	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	41.5	165.7	kip ft	0.250	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.027	-	in	-	-
Deflection Total	1	0.455	1.250	in	0.364	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 12' 6" - Critical

Moment, M_x = 41.5 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 6.6 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.063



Pass

Flexure Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Yielding: 12' 6" - Critical

Dist of M_{rx} along member = 12' 6" ft, in

Required flexural strength, M_{rx1} = 41.5 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.250



Pass

Deflection



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1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =12' 6" ft, in
Max. Total load deflection =0.455 in
Span over limit =1.250 in
Design limit =1.250 in
Utilization Ratio =**0.364**



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 12' 6" - Critical

Web class Compact AISC 360 Table B4.1b
h / t_w =**56.800**
h / t_w limit for plastic stress distribution =**90.553**

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 25' 0" - Critical

Position of V_{ry} =25' 0" ft, in
Required major axis shear strength, V_{ry} =17.0 kip
Design shear strength =106.0 kip AISC 360 G2
Ratio =**0.160**



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

12' 6" Max Moment Position - Critical

Distance of M along member =12' 6" ft, in
Required flexural strength, M_x =106.1 kip ft
Design flexural strength =255.4 kip ft
Ratio =**0.416**



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

12' 6" Max Moment and UR Position - Critical

Layout and strength of shear connectors
Maximum group spacing, s =2' 0" ft, in
Maximum permitted group spacing =3' 0" ft, in
Number of shear connectors over full beam length 13
Number of shear connectors to critical point, N_a 6
Degree of shear connection =**0.269**
Absolute minimum degree of shear connection =**0.250**
Optimum amount of shear connection =**0.500**
Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

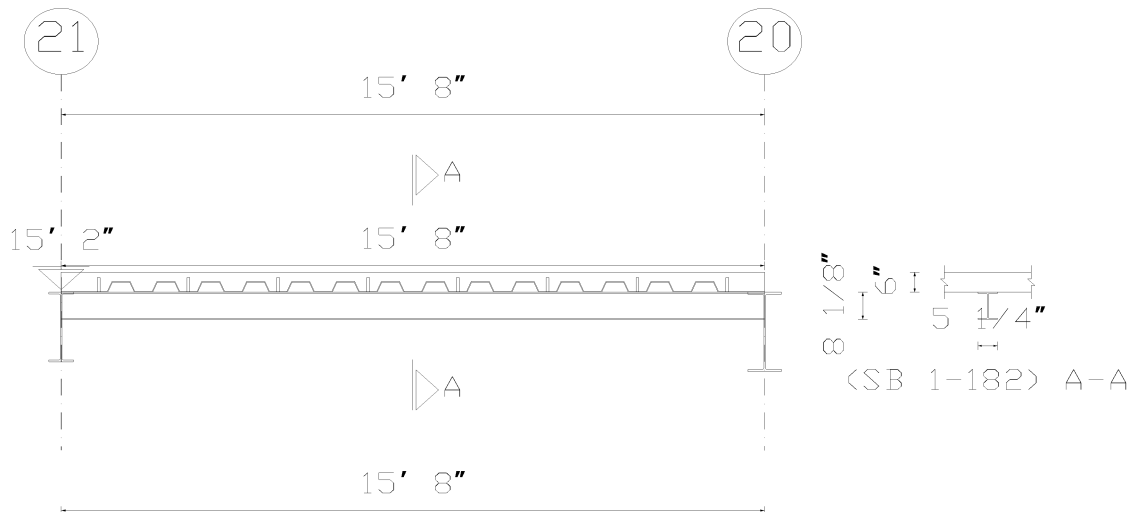
Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as}	=1213.2 in ⁴
Long term inertia, I_{al}	=1213.2 in ⁴
Short term inertia @ partial interaction, I_{as}	=774.3 in ⁴
Long term inertia @ partial interaction, I_{al}	=774.3 in ⁴
Position Total load deflection	=12' 6" ft, in
Deflection with full shear connection n, δ	=0.509 in
Deflection of steel beam alone, δ_s	=0.985 in
Minimum degree of shear connection	=26.92 %
Deflection with partial shear connection, δ	=0.598 in
Span over limit	=1.250 in
Design limit	=1.250 in
Utilization Ratio	=0.479

Pass

SB 1-182



Second Level: SB 1-182 = 1
W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	15' 8"	•	1.000	•	1.000	•	1.000	•	1.000
support	15' 8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	15' 8"	8	1	2

Decking

Manufacturer Name Gauge Yield strength



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VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
 6" ft, in 3' 11" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
 Type Area Yield strength Type Area Yield strength
 Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.428	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-10.6	56.2	kip	0.188	✓ Pass
Flexure	2	41.4	107.1	kip ft	0.386	✓ Pass
Connector Resistance	2	4	8	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.014	-	in	-	-
Deflection Slab	2	0.235	0.783	in	0.299	✓ Pass
Deflection Dead	2	0.024	0.522	in	0.046	✓ Pass
Deflection Live	2	0.119	0.522	in	0.228	✓ Pass
Deflection Post Composite	2	0.143	0.522	in	0.273	✓ Pass
Deflection Total	2	0.391	0.783	in	0.499	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	4.1	56.2	kip	0.073	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	16.0	63.7	kip ft	0.251	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.014	-	in	-	-
Deflection Total	1	0.335	0.783	in	0.428	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 7' 10" - Critical

Moment, M_x =16.0 kip ftElastic modulus of steel, E =29000 ksiMinimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major



Project

Structure

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1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 4.1 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.073



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 10" - Critical

Dist of M_{rx} along member = 7' 10" ft, inRequired flexural strength, M_{rx1} = 16.0 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.251



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 7' 10" ft, in

Max. Total load deflection = 0.335 in

Span over limit = 0.783 in

Design limit = 0.783 in

Utilization Ratio = 0.428



Pass

Classification

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 10" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w = 29.900 h / t_w limit for plastic stress distribution = 90.553

Vertical Shear

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 15' 8" - Critical

Position of V_{ry} = 15' 8" ft, inRequired major axis shear strength, V_{ry} = 10.6 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.188



Pass

Flexure

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 10" Max Moment Position - Critical

Distance of M along member = 7' 10" ft, in

Required flexural strength, M_x = 41.4 kip ft



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Design flexural strength =107.1 kip ft

Ratio =0.386



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 10" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4

Degree of shear connection =0.262

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} =376.5 in⁴Long term inertia, I_{al} =376.5 in⁴Short term inertia @ partial interaction, I_{as} =222.9 in⁴Long term inertia @ partial interaction, I_{al} =222.9 in⁴

Position Total load deflection =7' 10" ft, in

Deflection with full shear connection n, δ =0.337 in

Deflection of steel beam alone, δ_s =0.734 in

Minimum degree of shear connection =26.20 %

Deflection with partial shear connection, δ =0.391 in

Span over limit =0.783 in

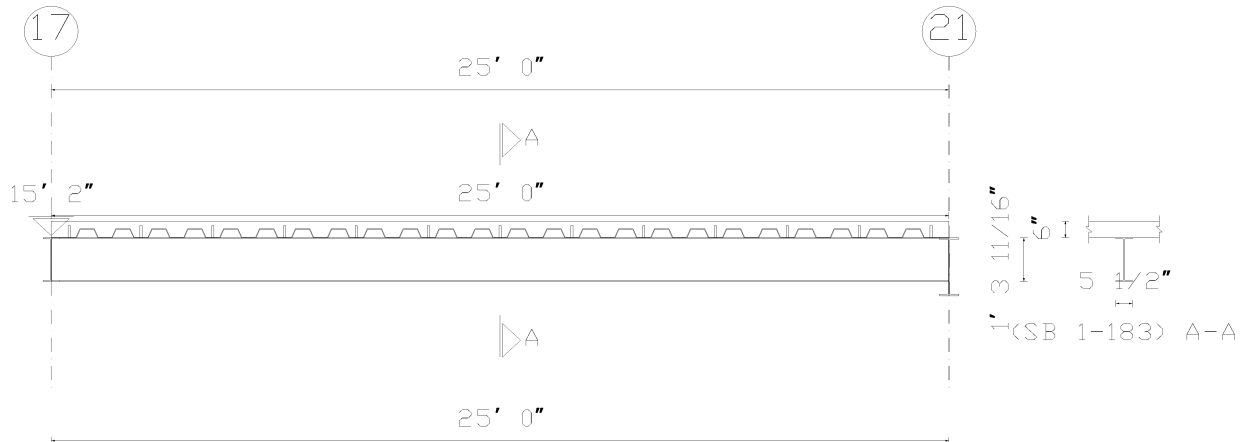
Design limit =0.783 in

Utilization Ratio =0.499



Pass

SB 1-183



Second Level: SB 1-183 - 1
W 16x26 A992-50 (13) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	25' 0"	•	1.000		1.000		1.000		1.000
support	25' 0"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0"	25' 0"	13	1	2

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 5' 5 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 16x26 (13)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.379	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	-17.7	106.0	kip	0.167	✓ Pass
Flexure	2	110.6	255.4	kip ft	0.433	✓ Pass
Connector Resistance	2	6	13	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.027	-	in	-	-

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Deflection Slab	2	0.326	1.250	in	0.261	✓ Pass
Deflection Dead	2	0.045	0.833	in	0.054	✓ Pass
Deflection Live	2	0.224	0.833	in	0.269	✓ Pass
Deflection Post Composite	2	0.269	0.833	in	0.323	✓ Pass
Deflection Total	2	0.621	1.250	in	0.497	✓ Pass

Construction Stage

W 16x26(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	6.9	106.0	kip	0.065	✓ Pass
Shear Minor		No Significant Forces		kip	-	Not required
Flexure Major	1	43.1	165.7	kip ft	0.260	✓ Pass
Flexure Minor		No Significant Forces		kip ft	-	Not required
Axial Tension		No Significant Forces		kip	-	Not required
Torsion		No Significant Forces		-	-	Not required
Deflection Self weight	1	0.027	-	in	-	-
Deflection Total	1	0.473	1.250	in	0.379	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Flexural: Position 12' 6" - Critical

Moment, M_x = 43.1 kip ft

Elastic modulus of steel, E = 29000 ksi

Minimum yield stress, F_y = 50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, in

Required major axis shear strength, V_{ry} = 6.9 kip

Design shear strength = 106.0 kip AISC 360 G2

Ratio = 0.065



Pass

Flexure Major

1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Yielding: 12' 6" - Critical

Dist of M_{rx} along member = 12' 6" ft, in

Required flexural strength, M_{rx1} = 43.1 kip ft

Design flexural strength = 165.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.260



Pass

Deflection



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1 Construction Stage

Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection =12' 6" ft, in
Max. Total load deflection =0.473 in
Span over limit =1.250 in
Design limit =1.250 in
Utilization Ratio =0.379



Pass

Classification2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 12' 6" - Critical

Web class Compact AISC 360 Table B4.1b
h / t_w =56.800
h / t_w limit for plastic stress distribution =90.553

Vertical Shear2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

Position 25' 0" - Critical

Position of V_{ry} =25' 0" ft, in
Required major axis shear strength, V_{ry} =-17.7 kip
Design shear strength =106.0 kip AISC 360 G2
Ratio =0.167



Pass

Flexure2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

12' 6" Max Moment Position - Critical

Distance of M along member =12' 6" ft, in
Required flexural strength, M_x =110.6 kip ft
Design flexural strength =255.4 kip ft
Ratio =0.433



Pass

Connector Resistance2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 16x26 A992-50 - Critical

12' 6" Max Moment and UR Position - Critical

Layout and strength of shear connectors
Maximum group spacing, s =2' 0" ft, in
Maximum permitted group spacing =3' 0" ft, in
Number of shear connectors over full beam length 13
Number of shear connectors to critical point, N_a 6
Degree of shear connection =0.269
Absolute minimum degree of shear connection =0.250
Optimum amount of shear connection =0.500
Partial shear connection



Pass

Deflection2 LRFD₂-1.2D+1.6L - Critical

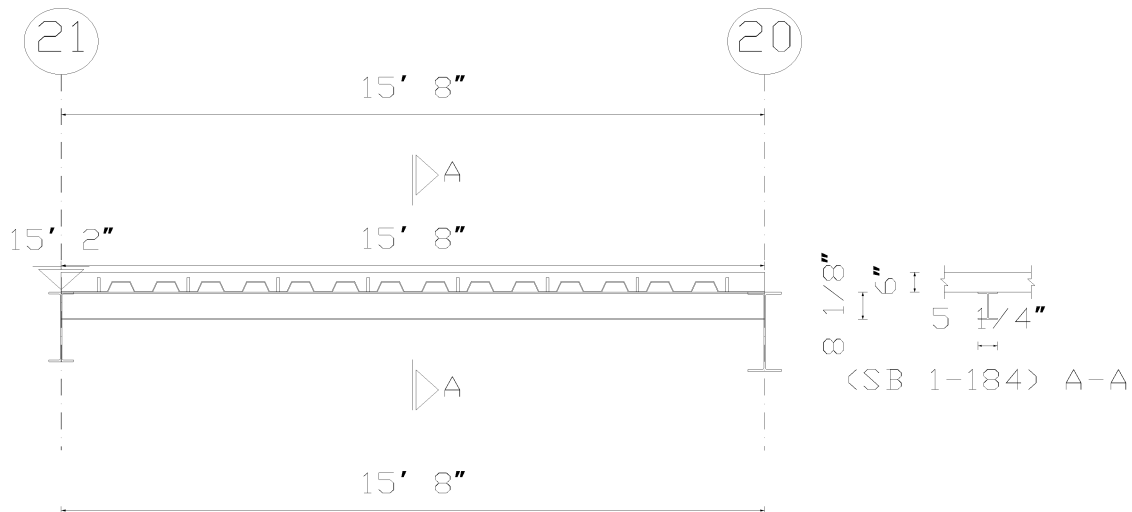
Span 1 W 16x26 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as}	=1222.6 in ⁴
Long term inertia, I_{al}	=1222.6 in ⁴
Short term inertia @ partial interaction, I_{as}	=779.2 in ⁴
Long term inertia @ partial interaction, I_{al}	=779.2 in ⁴
Position Total load deflection	=12' 6" ft, in
Deflection with full shear connection n, δ	=0.529 in
Deflection of steel beam alone, δ_s	=1.026 in
Minimum degree of shear connection	=26.92 %
Deflection with partial shear connection, δ	=0.621 in
Span over limit	=1.250 in
Design limit	=1.250 in
Utilization Ratio	=0.497

Pass

SB 1-184



Second Level: SB 1-184 - 1
W 8x18 A992-50 (8) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	15' 8"	•	1.000	•	1.000	•	1.000	•	1.000
support	15' 8"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing x rib
0"	15' 8"	8	1	2

Decking

Manufacturer Name Gauge Yield strength



Project

Structure

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VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
 6" ft, in 3' 11" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
 Type Area Yield strength Type Area Yield strength
 Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary W 8x18 (8)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.446	✓ Pass
Classification	2	Compact	-	-	-	✓ Pass
Vertical Shear	2	11.0	56.2	kip	0.196	✓ Pass
Flexure	2	43.1	107.1	kip ft	0.403	✓ Pass
Connector Resistance	2	4	8	-	-	✓ Pass
Natural Frequency	2	0.0	-	Hz	-	Not required
Deflection Self weight	2	0.014	-	in	-	-
Deflection Slab	2	0.245	0.783	in	0.312	✓ Pass
Deflection Dead	2	0.025	0.522	in	0.048	✓ Pass
Deflection Live	2	0.124	0.522	in	0.238	✓ Pass
Deflection Post Composite	2	0.149	0.522	in	0.285	✓ Pass
Deflection Total	2	0.407	0.783	in	0.520	✓ Pass

Construction Stage

W 8x18(A992-50)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Unknown	-	-	-	Not required
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	1	4.2	56.2	kip	0.076	✓ Pass
Shear Minor	No Significant Forces			kip	-	Not required
Flexure Major	1	16.6	63.7	kip ft	0.261	✓ Pass
Flexure Minor	No Significant Forces			kip ft	-	Not required
Axial Tension	No Significant Forces			kip	-	Not required
Torsion	No Significant Forces			-	-	Not required
Deflection Self weight	1	0.014	-	in	-	-
Deflection Total	1	0.349	0.783	in	0.446	✓ Pass

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

Construction Stage

Classification

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Flexural: Position 7' 10" - Critical

Moment, M_x =16.6 kip ftElastic modulus of steel, E =29000 ksiMinimum yield stress, F_y =50.00 ksi

Flexural section class Compact AISC 360 Table B4.1b

Shear Major



Project

Structure

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1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 4.2 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.076



Pass

Flexure Major

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Yielding: 7' 10" - Critical

Dist of M_{rx} along member = 7' 10" ft, inRequired flexural strength, M_{rx1} = 16.6 kip ft

Design flexural strength = 63.7 kip ft AISC 360 F1, F2 and F3

Ratio = 0.261



Pass

Deflection

1 Construction Stage

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Position Total load deflection = 7' 10" ft, in

Max. Total load deflection = 0.349 in

Span over limit = 0.783 in

Design limit = 0.783 in

Utilization Ratio = 0.446



Pass

Classification

2 LRF_{D2}-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 7' 10" - Critical

Web class Compact AISC 360 Table B4.1b

 h / t_w = 29.900 h / t_w limit for plastic stress distribution = 90.553

Vertical Shear

2 LRF_{D2}-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Position 0" - Critical

Position of V_{ry} = 0" ft, inRequired major axis shear strength, V_{ry} = 11.0 kip

Design shear strength = 56.2 kip AISC 360 G2

Ratio = 0.196



Pass

Flexure

2 LRF_{D2}-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 10" Max Moment Position - Critical

Distance of M along member = 7' 10" ft, in

Required flexural strength, M_x = 43.1 kip ft

Design flexural strength =107.1 kip ft

Ratio =0.403



Pass

Connector Resistance

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

7' 10" Max Moment and UR Position - Critical

Layout and strength of shear connectors

Maximum group spacing, s =2' 0" ft, in

Maximum permitted group spacing =3' 0" ft, in

Number of shear connectors over full beam length 8

Number of shear connectors to critical point, N_a 4

Degree of shear connection =0.262

Absolute minimum degree of shear connection =0.250

Optimum amount of shear connection =0.500

Partial shear connection



Pass

Deflection

2 LRFD₂-1.2D+1.6L - Critical

Span 1 W 8x18 A992-50 - Critical

Deflection Total - Critical

Short term inertia, I_{as} =376.5 in⁴

Long term inertia, I_{al} =376.5 in⁴

Short term inertia @ partial interaction, I_{as} =222.9 in⁴

Long term inertia @ partial interaction, I_{al} =222.9 in⁴

Position Total load deflection =7' 10" ft, in

Deflection with full shear connection n, δ =0.351 in

Deflection of steel beam alone, δ_s =0.765 in

Minimum degree of shear connection =26.20 %

Deflection with partial shear connection, δ =0.407 in

Span over limit =0.783 in

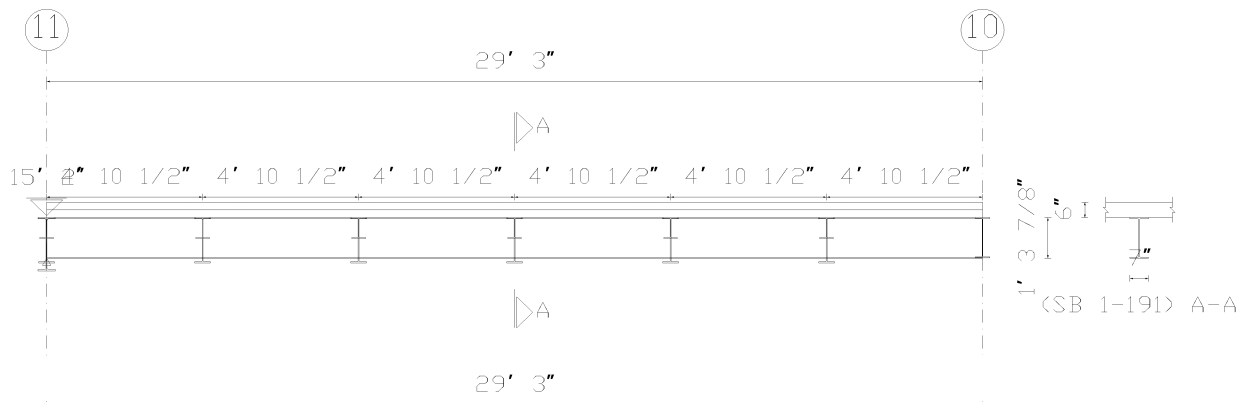
Design limit =0.783 in

Utilization Ratio =0.520



Pass

SB 1-191



Second Level: SB 1-191 = 1 (W 16x36 A992-50 (0) [1])

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 10 1/2"		1.000		1.000		1.000		1.000
member	4' 10 1/2"	•						•	
sub-beam	4' 10 1/2"		1.000		1.000		1.000		1.000
member	9' 9"	•						•	
sub-beam	4' 10 1/2"		1.000		1.000		1.000		1.000
member	14' 7 1/2"	•						•	
sub-beam	4' 10 1/2"		1.000		1.000		1.000		1.000
member	19' 6"	•						•	
sub-beam	4' 10 1/2"		1.000		1.000		1.000		1.000
member	24' 4 1/2"	•						•	
sub-beam	4' 10 1/2"		1.000		1.000		1.000		1.000
support	29' 3"	•		•		•		•	

Connectors\Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing distance [ft, in]

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f_c'
6" ft, in 6' 1 1/2" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
0.00 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary

Beam subject to loads which cause negative moments along beam



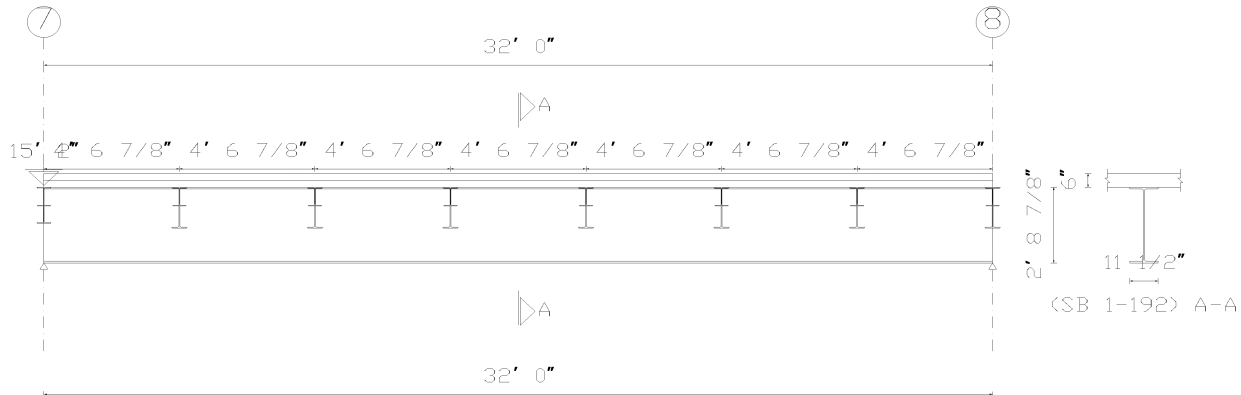
Beyond Scope

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

SB 1-191 - No results available.

SB 1-192



Second Level: SB 1-192 - 1
W 33x118 A992-50 (Q) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 6 7/8"		1.000		1.000		1.000		1.000
member	4' 6 7/8"	•						•	
sub-beam	4' 6 7/8"		1.000		1.000		1.000		1.000
member	9' 1 3/4"	•						•	
sub-beam	4' 6 7/8"		1.000		1.000		1.000		1.000
member	13' 8 5/8"	•						•	
sub-beam	4' 6 7/8"		1.000		1.000		1.000		1.000
member	18' 3 3/8"	•						•	
sub-beam	4' 6 7/8"		1.000		1.000		1.000		1.000
member	22' 10 1/4"	•						•	
sub-beam	4' 6 7/8"		1.000		1.000		1.000		1.000
member	27' 5 1/8"	•						•	
sub-beam	4' 6 7/8"		1.000		1.000		1.000		1.000
support	32' 0"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing distance [ft, in]

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab

Overall depth Effective Width Concrete type Minimum compressive strength, f'
6" ft, in 8' 0" ft, in Normal 4.00 ksi

Reinforcement

Transverse reinforcement Reinforcement for crack control or fire requirements
Type Area Yield strength Type Area Yield strength
Deformed # 3 @ 8" 0.17 in²/ft 60.00 ksi 6x6 W1.4xW1.4 0.03 in²/ft 65.00 ksi

Static Design Summary

Summary

Must be simply supported

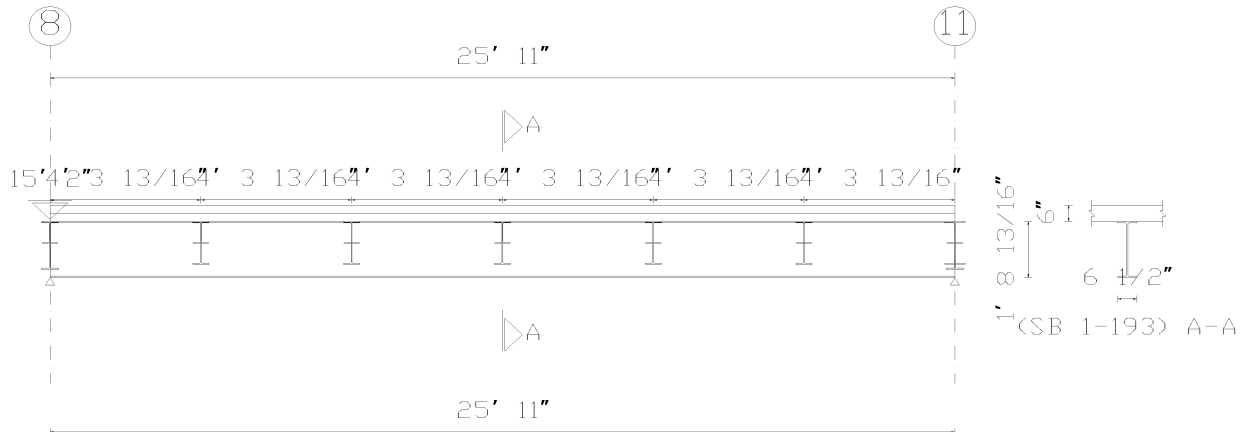
 Beyond Scope

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

SB 1-192 - No results available.

SB 1-193



Second Level: SB 1-193 - 1
W 21x50 A992-50 (0) [Deformed # 3 @ 8"]

Restraints

Source	Distance / Length [ft, in]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0"	•		•		•		•	
sub-beam	4' 3 7/8"		1.000		1.000		1.000		1.000
member	4' 3 7/8"	•						•	
sub-beam	4' 3 7/8"		1.000		1.000		1.000		1.000
member	8' 7 5/8"	•						•	
sub-beam	4' 3 7/8"		1.000		1.000		1.000		1.000
member	12' 11 1/2"	•						•	
sub-beam	4' 3 7/8"		1.000		1.000		1.000		1.000
member	17' 3 3/8"	•						•	
sub-beam	4' 3 7/8"		1.000		1.000		1.000		1.000
member	21' 7 1/8"	•						•	
sub-beam	4' 3 7/8"		1.000		1.000		1.000		1.000
support	25' 11"	•		•		•		•	

Connectors/Layout

Name Diameter As welded height Specified ultimate tensile strength
AISC 3/4" x 4 3/8" 3/4" 4" 65.00

Distance end 1 [ft, in]	Distance end 2 [ft, in]	Number of connectors in length	Number of connectors in group	Group spacing distance [ft, in]

Decking

Manufacturer Name Gauge Yield strength
VULCRAFT 3VLI 36" 1/32" ft, in 40.00 ksi

Slab



Project

Structure

Calc. by

monre

Date

11/1/2024

Chk'd by

Date

Job Ref.

Sheet no.

Page 445/445

App'd by

Date

Overall depth	Effective Width	Concrete type	Minimum compressive strength, f_c'
6" ft, in	6' 5 3/4" ft, in	Normal	4.00 ksi

Reinforcement

Transverse reinforcement			Reinforcement for crack control or fire requirements		
Type	Area	Yield strength	Type	Area	Yield strength
Deformed # 3 @ 8"	0.17 in ² /ft	60.00 ksi	6x6 W1.4xW1.4	0.03 in ² /ft	65.00 ksi

Static Design Summary

Summary

Must be simply supported



Beyond Scope

Regional code: United States (ACI/AISC), design code: AISC 360/341 LRFD (2010)

Static Design Calculations

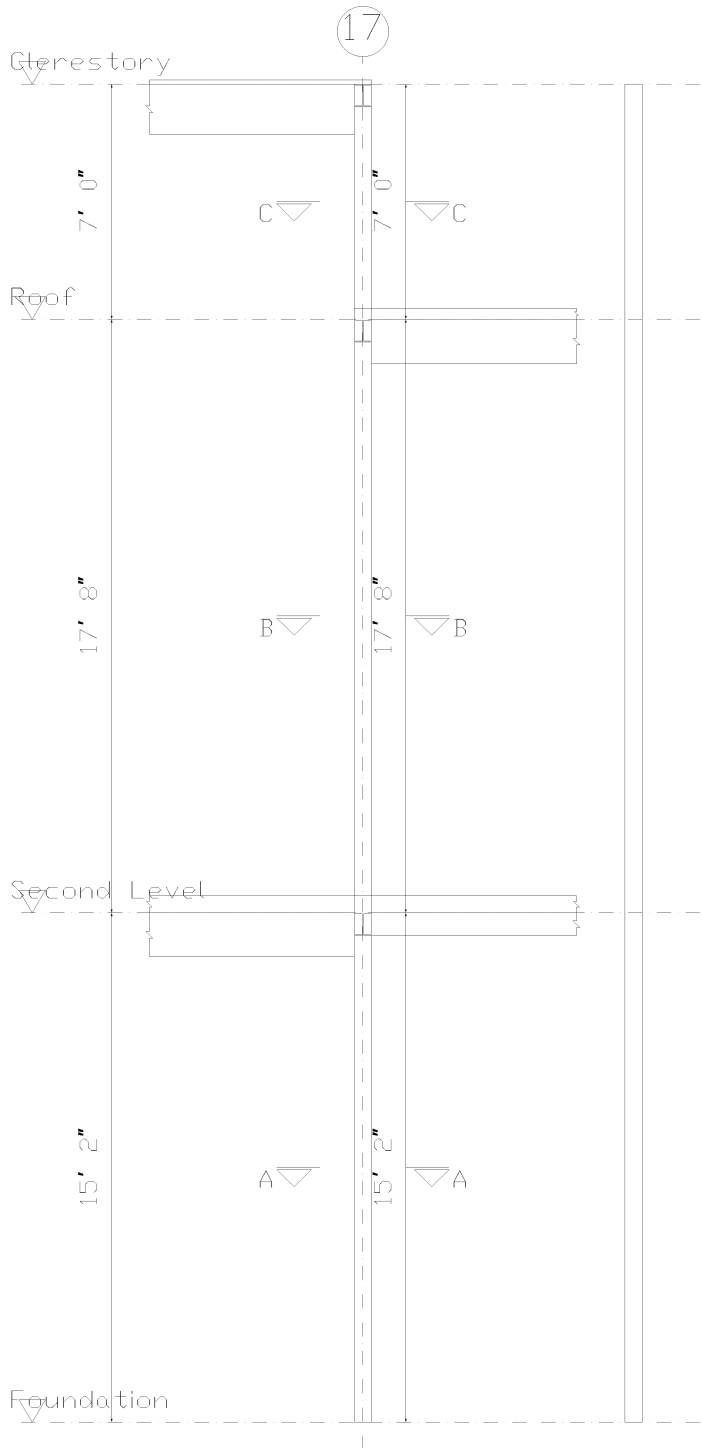
SB 1-193 - No results available.

Steel

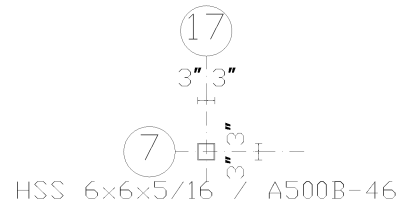
Columns

Rolled

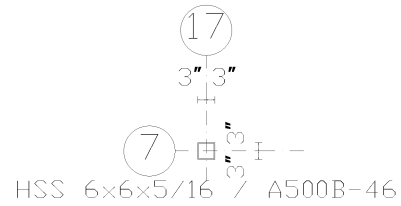
SC 7/17



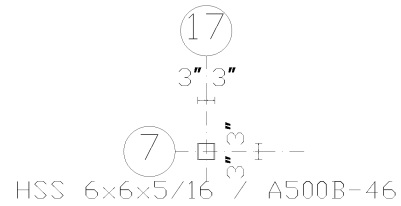
SC 7/17 C-C



SC 7/17 B-B



SC 7/17 A-A



SC 7/17

Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
4	floor	39' 10"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

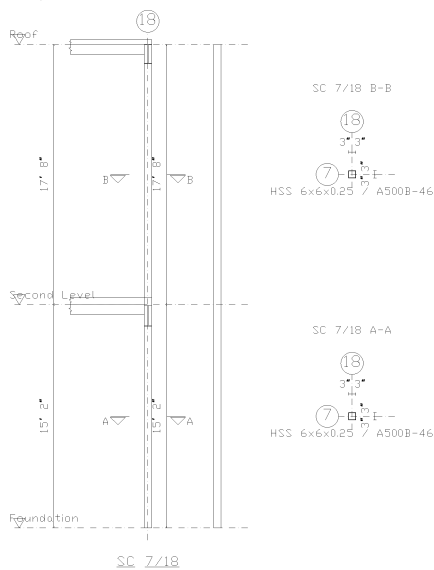
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
4	floor	39' 10"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 6x6x5/16 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	6.5	46.9	kip ft	0.138	✓ Pass
Flexure Minor	1	5.6	46.9	kip ft	0.119	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	75.6	175.3	kip	0.431	✓ Pass
Combined Forces	2	-	-	-	0.584	✓ Pass

SC 7/18



Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

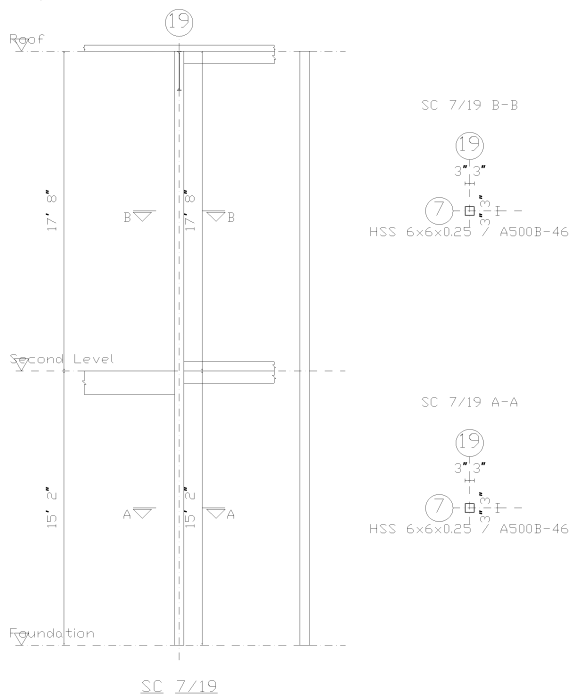
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 6x6x0.25 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	6.5	38.6	kip ft	0.168	✓ Pass
Flexure Minor	1	3.7	38.6	kip ft	0.095	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	39.4	144.4	kip	0.273	✓ Pass
Combined Forces	2	-	-	-	0.447	✓ Pass

SC 7/19



Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

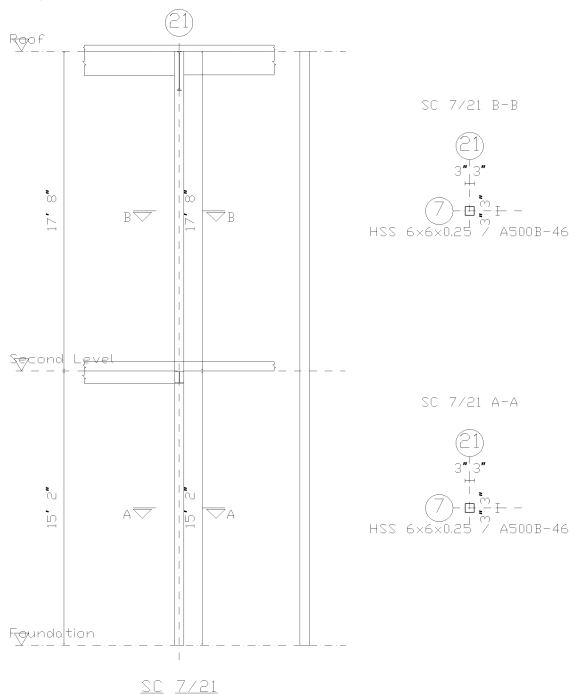
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 6x6x0.25 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	18.6	38.6	kip ft	0.482	✓ Pass
Flexure Minor	1	6.3	38.6	kip ft	0.163	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	103.2	144.4	kip	0.715	✓ Pass
Combined Forces	2	-	-	-	1.171	✗ Fail

SC 7/21



Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

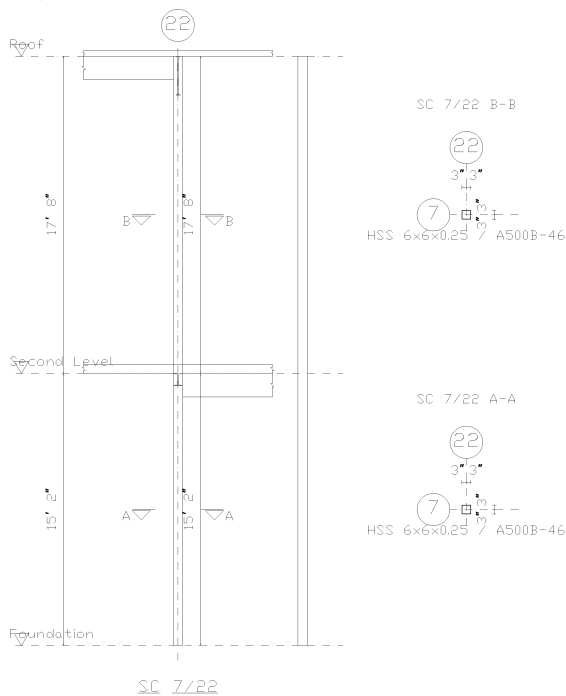
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 6x6x0.25 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	1	3.7	38.6	kip ft	0.096	✓ Pass
Flexure Minor	2	-8.1	38.6	kip ft	0.209	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	73.0	144.4	kip	0.505	✓ Pass
Combined Forces	2	-	-	-	0.691	✓ Pass

SC 7/22



Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

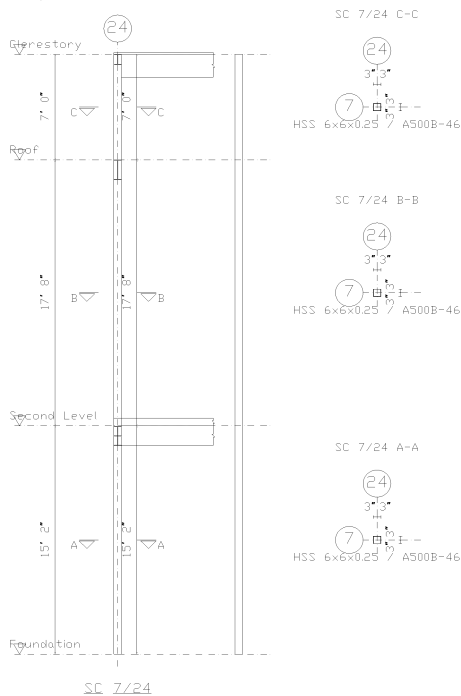
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 6x6x0.25 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	1	3.7	38.6	kip ft	0.095	✓ Pass
Flexure Minor	2	25.6	38.6	kip ft	0.662	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	129.5	144.4	kip	0.897	✓ Pass
Combined Forces	2	-	-	-	1.487	✗ Fail

SC 7/24



Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
4	floor	39' 10"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
3	floor	32' 10"	No		No	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

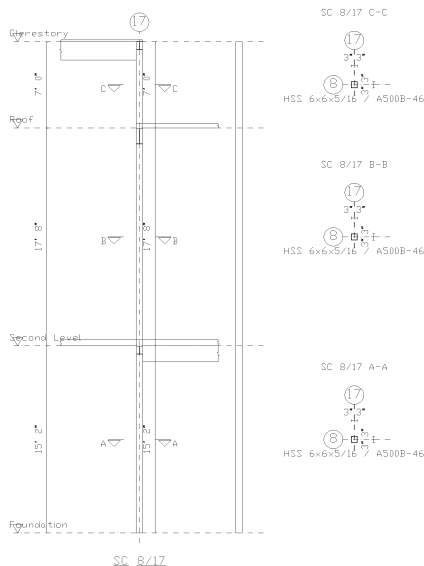
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
4	floor	39' 10"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
3	floor	32' 10"	Yes		No	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 6x6x0.25 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	6.7	38.6	kip ft	0.173	✓ Pass
Flexure Minor	2	-3.8	38.6	kip ft	0.099	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	61.9	144.4	kip	0.429	✓ Pass
Combined Forces	2	-	-	-	0.671	✓ Pass

SC 8/17



Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
4	floor	39' 10"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

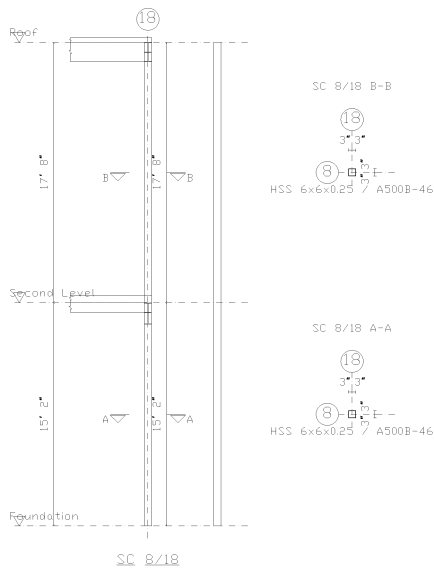
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
4	floor	39' 10"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 6x6x5/16 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	-18.3	46.9	kip ft	0.389	✓ Pass
Flexure Minor	2	10.2	46.9	kip ft	0.218	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	118.3	175.3	kip	0.675	✓ Pass
Combined Forces	2	-	-	-	1.074	✗ Fail

SC 8/18



Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

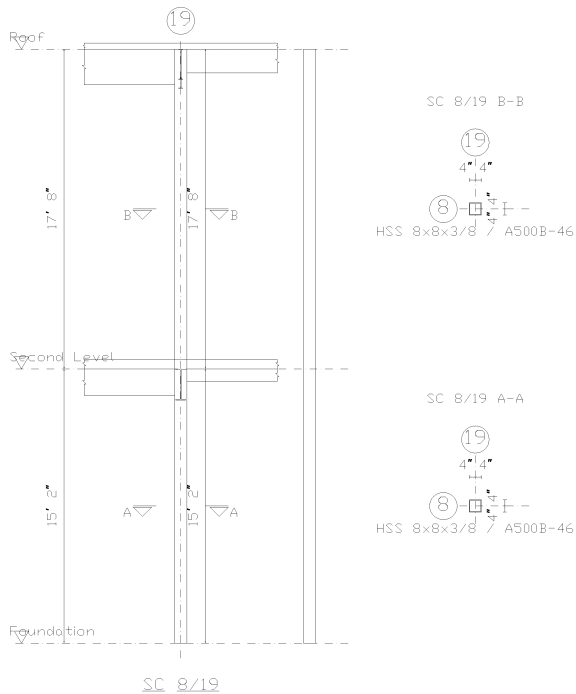
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 6x6x0.25 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	-4.2	38.6	kip ft	0.108	✓ Pass
Flexure Minor	2	6.6	38.6	kip ft	0.170	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	58.6	144.4	kip	0.406	✓ Pass
Combined Forces	2	-	-	-	0.548	✓ Pass

SC 8/19



Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

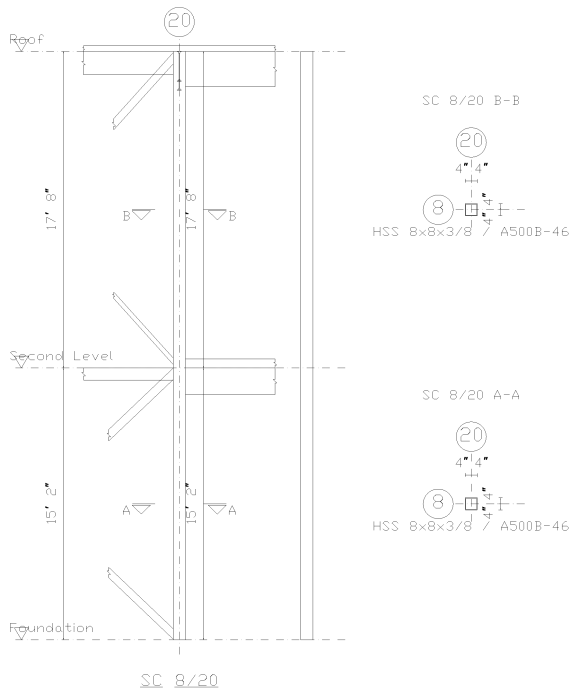
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 8x8x3/8 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	2	-0.6	120.6	kip	0.005	✓ Pass
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	-8.4	101.4	kip ft	0.083	✓ Pass
Flexure Minor	1	17.2	101.4	kip ft	0.169	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	230.4	341.4	kip	0.675	✓ Pass
Combined Forces	2	-	-	-	0.778	✓ Pass

SC 8/20



Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

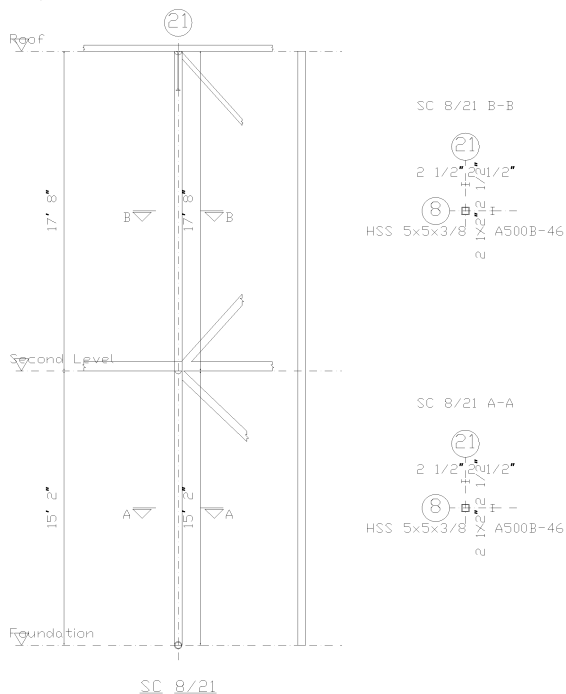
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 8x8x3/8 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	-19.9	101.4	kip ft	0.196	✓ Pass
Flexure Minor	2	-16.7	101.4	kip ft	0.165	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	194.5	341.4	kip	0.570	✓ Pass
Combined Forces	2	-	-	-	0.775	✓ Pass

SC 8/21



Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

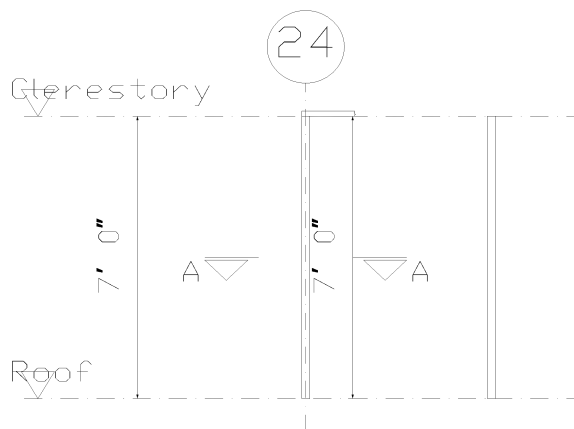
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

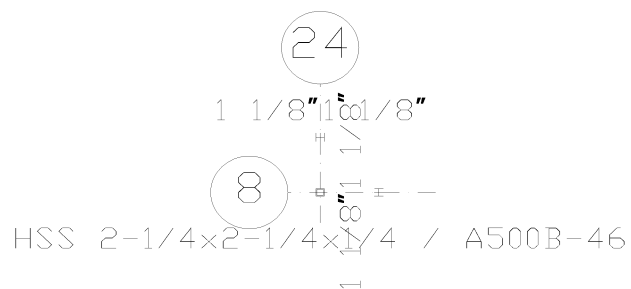
Summary HSS 5x5x3/8 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	5.1	36.6	kip ft	0.140	✓ Pass
Flexure Minor	2	5.8	36.6	kip ft	0.160	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	70.2	135.2	kip	0.520	✓ Pass
Combined Forces	2	-	-	-	0.726	✓ Pass

SC 8/24



SC 8/24 A-A



SC 8/24

Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
2	floor	7' 0"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
1	floor	0"	No		No	

Strut Restraints

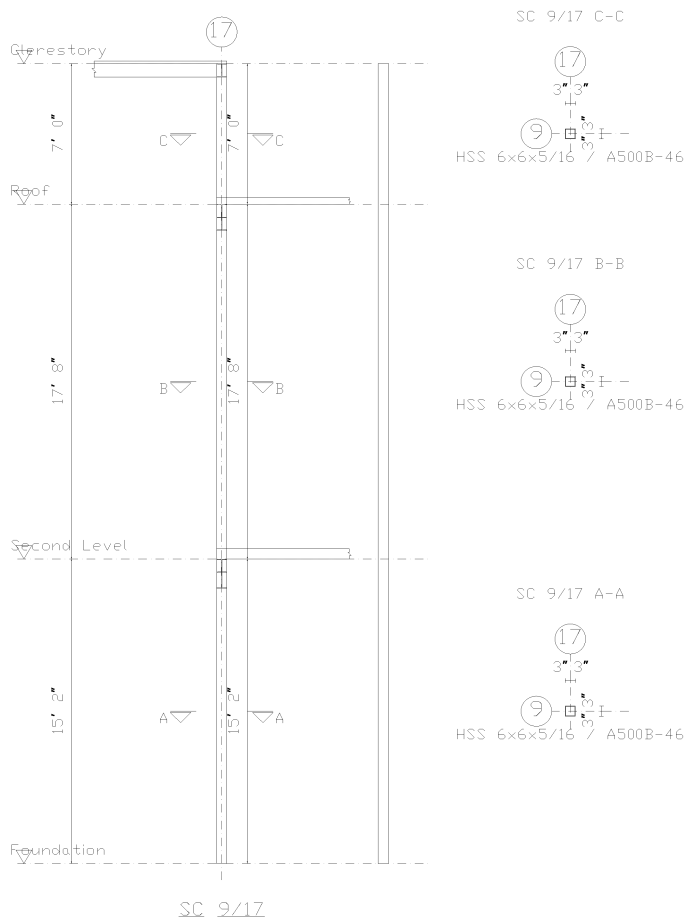
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
2	floor	7' 0"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
1	floor	0"	Yes		No	

Static Design Summary

Summary HSS 2-1/4x2-1/4x1/4 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	1	0.9	4.4	kip ft	0.210	✓ Pass
Flexure Minor	2	-1.4	4.4	kip ft	0.309	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	1	0.0	0.0	kip	0.000	⚠ Warning
Combined Forces	1	-	-	-	0.000	⚠ Warning

SC 9/17



Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
4	floor	39' 10"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

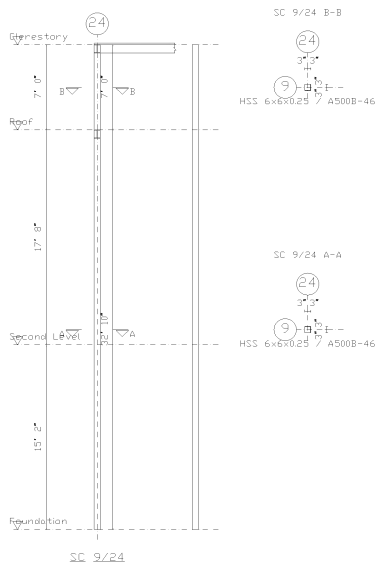
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
4	floor	39' 10"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 6x6x5/16 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	2	-0.2	74.1	kip	0.003	✓ Pass
Flexure Major	2	-10.2	46.9	kip ft	0.218	✓ Pass
Flexure Minor	2	1.7	46.9	kip ft	0.035	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	74.3	175.3	kip	0.424	✓ Pass
Combined Forces	2	-	-	-	0.631	✓ Pass

SC 9/24



Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
3	floor	39' 10"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
2	floor	32' 10"	No		No	
	sub-beam	32' 10"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

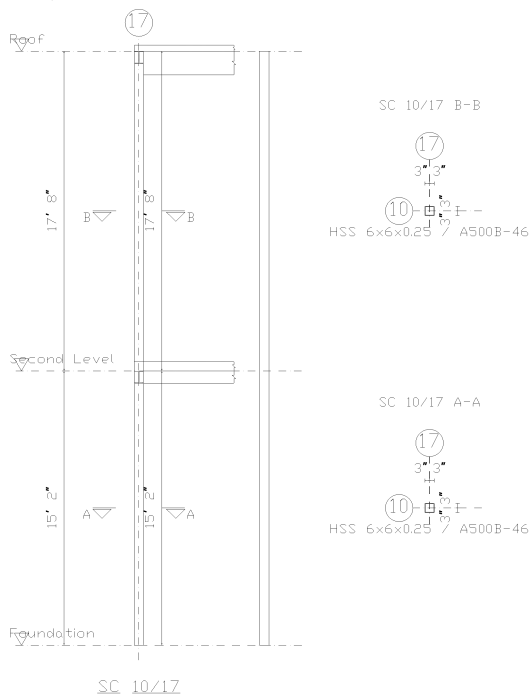
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
3	floor	39' 10"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
2	floor	32' 10"	Yes		No	
	sub-beam	32' 10"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 6x6x0.25 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	-1.4	38.6	kip ft	0.037	✓ Pass
Flexure Minor	1	-0.8	38.6	kip ft	0.021	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	1	5.8	28.4	kip	0.205	✓ Pass
Combined Forces	2	-	-	-	0.257	✓ Pass

SC 10/17



Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

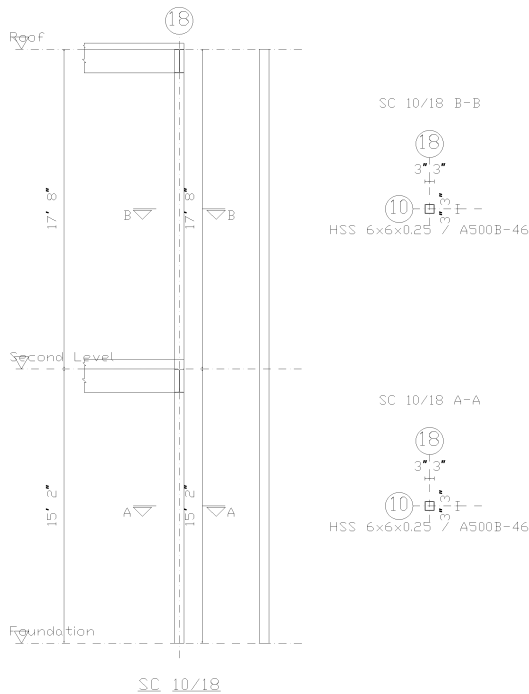
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 6x6x0.25 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	-2.2	38.6	kip ft	0.058	✓ Pass
Flexure Minor	1	-6.8	38.6	kip ft	0.176	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	31.2	144.4	kip	0.216	✓ Pass
Combined Forces	2	-	-	-	0.318	✓ Pass

SC 10/18



Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

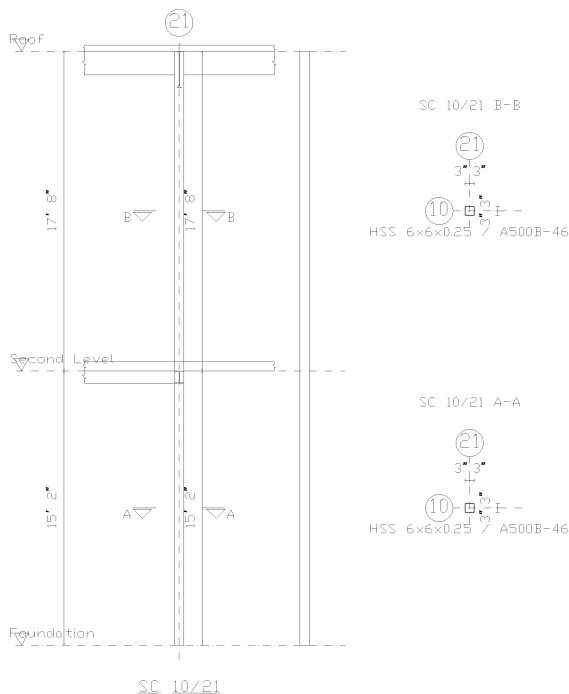
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 6x6x0.25 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	-6.0	38.6	kip ft	0.156	✓ Pass
Flexure Minor	2	6.4	38.6	kip ft	0.166	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	55.9	144.4	kip	0.387	✓ Pass
Combined Forces	2	-	-	-	0.674	✓ Pass

SC 10/21



Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

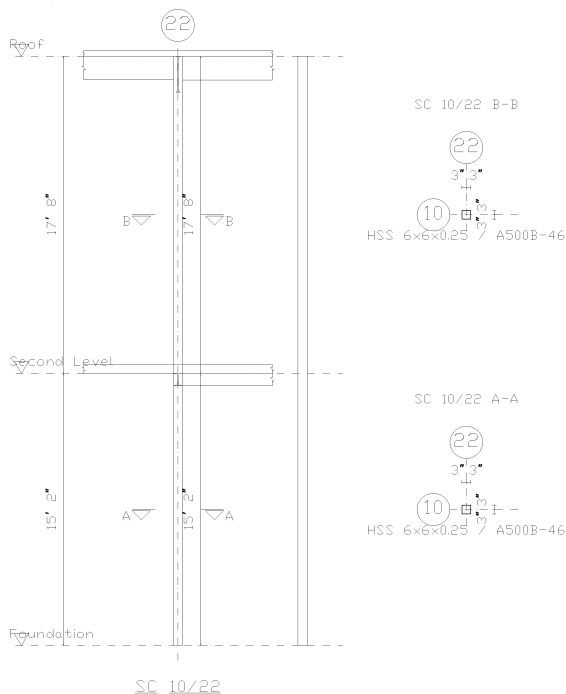
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 6x6x0.25 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	1	-3.4	38.6	kip ft	0.087	✓ Pass
Flexure Minor	2	-7.3	38.6	kip ft	0.189	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	68.0	144.4	kip	0.471	✓ Pass
Combined Forces	2	-	-	-	0.640	✓ Pass

SC 10/22



Date _____

Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

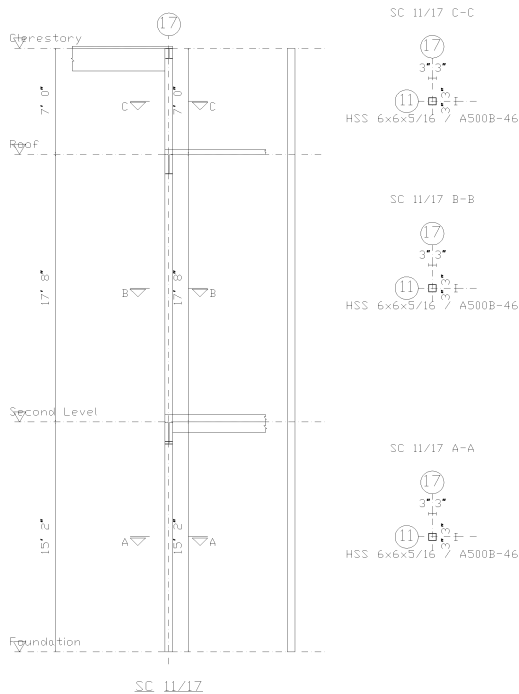
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 6x6x0.25 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	1	-3.5	38.6	kip ft	0.090	✓ Pass
Flexure Minor	2	-14.8	38.6	kip ft	0.384	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	90.3	144.4	kip	0.626	✓ Pass
Combined Forces	2	-	-	-	0.970	✓ Pass

SC 11/17



Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
4	floor	39' 10"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

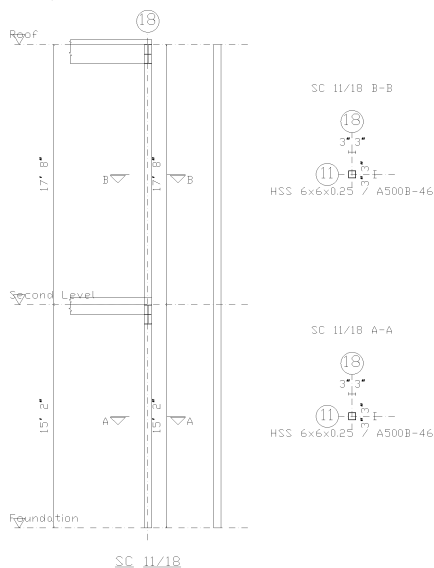
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
4	floor	39' 10"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 6x6x5/16 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	6.8	46.9	kip ft	0.144	✓ Pass
Flexure Minor	2	10.4	46.9	kip ft	0.221	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	117.1	175.3	kip	0.668	✓ Pass
Combined Forces	2	-	-	-	0.883	✓ Pass

SC 11/18



Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

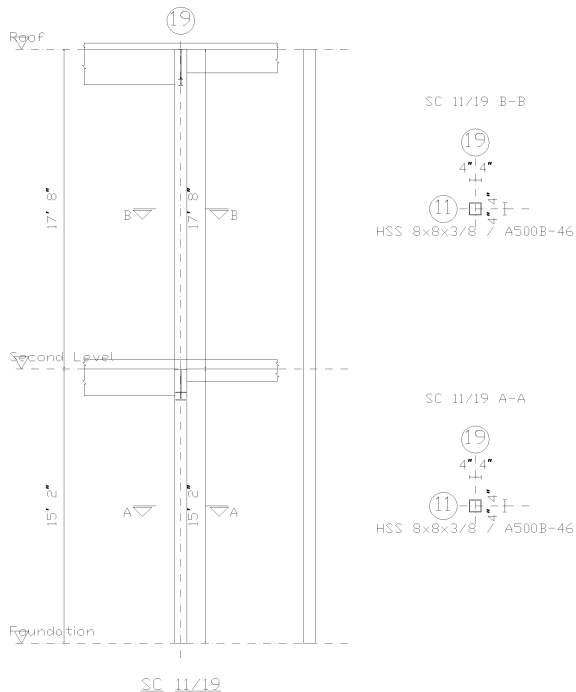
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 6x6x0.25 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	4.0	38.6	kip ft	0.104	✓ Pass
Flexure Minor	2	6.3	38.6	kip ft	0.162	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	52.8	144.4	kip	0.366	✓ Pass
Combined Forces	2	-	-	-	0.505	✓ Pass

SC 11/19



Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

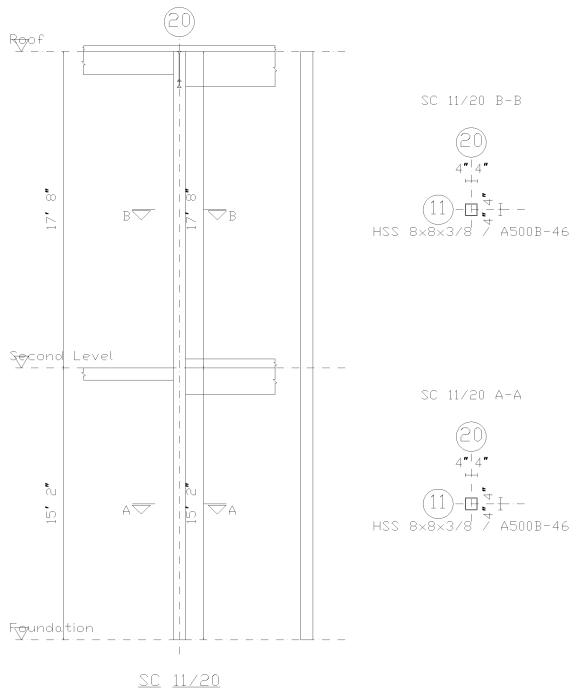
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 8x8x3/8 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	2	-2.4	120.6	kip	0.020	✓ Pass
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	-35.7	101.4	kip ft	0.352	✓ Pass
Flexure Minor	2	16.4	101.4	kip ft	0.161	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	183.6	341.4	kip	0.538	✓ Pass
Combined Forces	2	-	-	-	0.880	✓ Pass

SC 11/20



Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

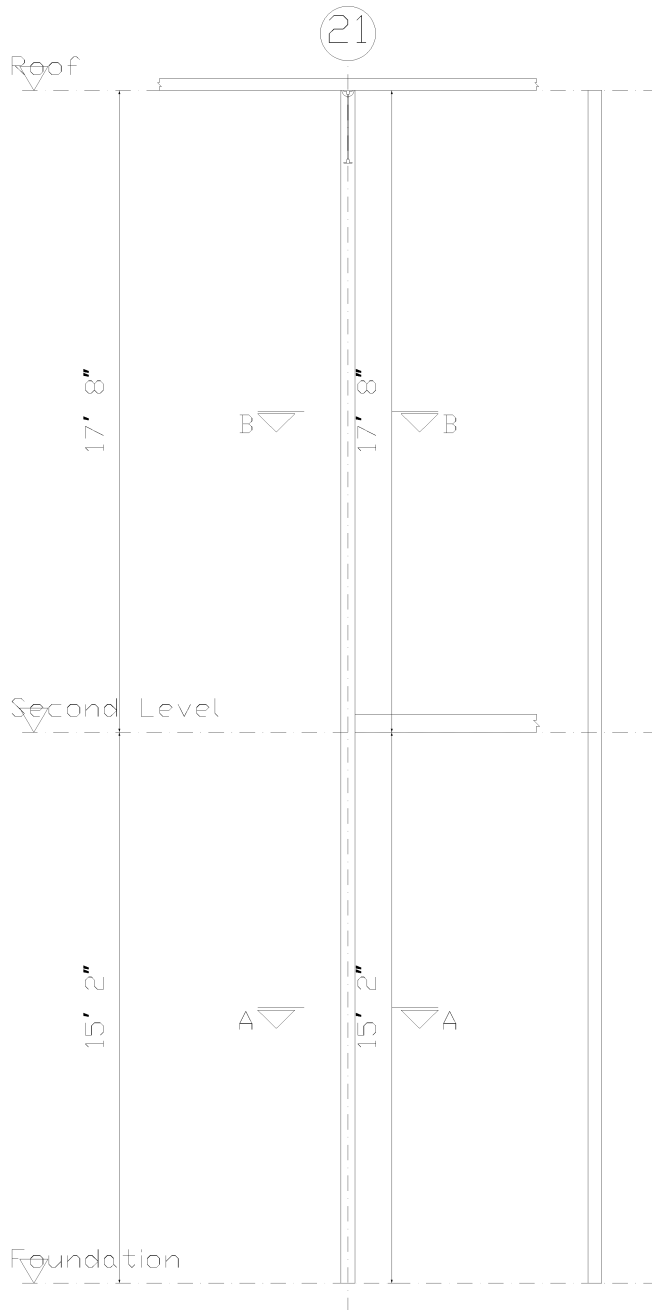
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 8x8x3/8 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	14.9	101.4	kip ft	0.147	✓ Pass
Flexure Minor	1	-16.0	101.4	kip ft	0.157	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	226.0	341.4	kip	0.662	✓ Pass
Combined Forces	2	-	-	-	0.827	✓ Pass

SC 11/21



SC 11/21 B-B

21
 2 1/4" 2 1/4"
 11
 HSS 4-1/2x4-1/2x1/2 / A500B-46
 2 1/4" 2 1/4"

SC 11/21 A-A

21
 2 1/4" 2 1/4"
 11
 HSS 4-1/2x4-1/2x1/2 / A500B-46
 2 1/4" 2 1/4"

SC 11/21

Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

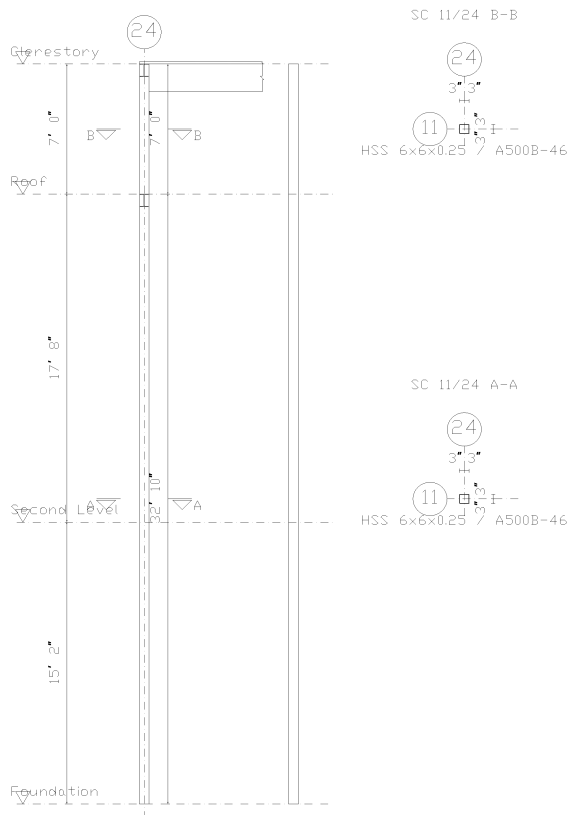
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 4-1/2x4-1/2x1/2 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	-2.6	35.2	kip ft	0.075	✓ Pass
Flexure Minor	1	5.3	35.2	kip ft	0.150	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	84.1	121.7	kip	0.691	✓ Pass
Combined Forces	2	-	-	-	0.788	✓ Pass

SC 11/24



SC 11/24

Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
3	floor	39' 10"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
2	floor	32' 10"	No		No	
	sub-beam	32' 10"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

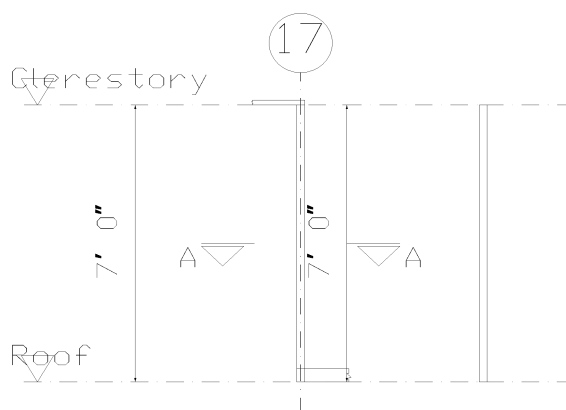
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
3	floor	39' 10"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
2	floor	32' 10"	Yes		No	
	sub-beam	32' 10"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

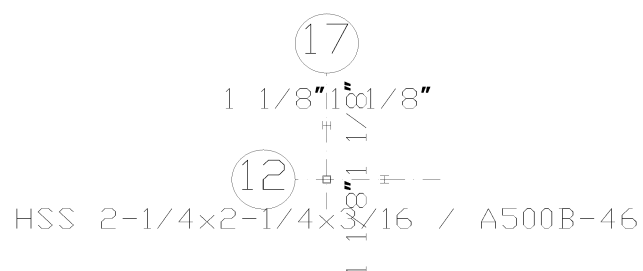
Summary HSS 6x6x0.25 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	1	0.3	38.6	kip ft	0.007	✓ Pass
Flexure Minor	2	-1.8	38.6	kip ft	0.047	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	13.3	28.4	kip	0.467	✓ Pass
Combined Forces	1	-	-	-	0.516	✓ Pass

SC 12/17



SC 12/17 A-A



SC 12/17

Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
2	floor	7' 0"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

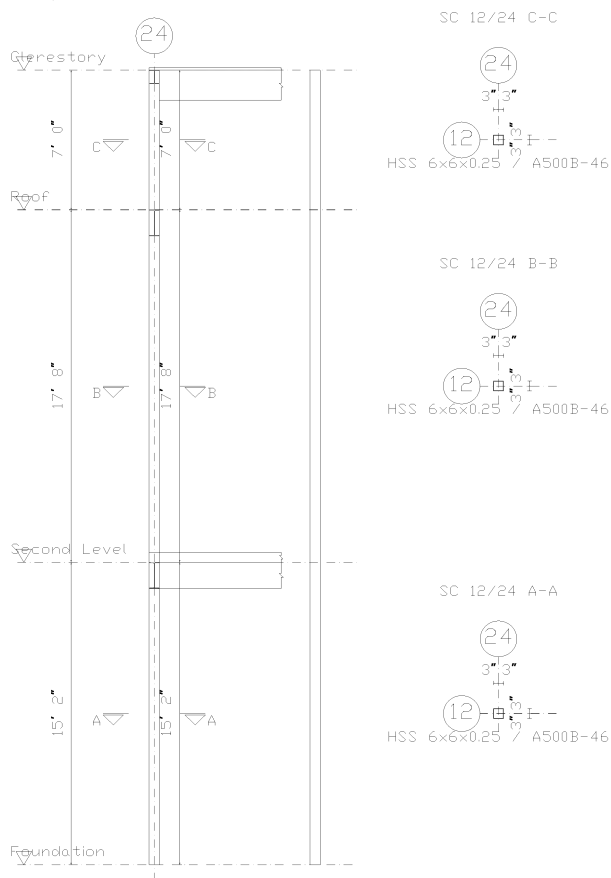
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
2	floor	7' 0"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 2-1/4x2-1/4x3/16 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	1	-0.7	3.6	kip ft	0.187	✓ Pass
Flexure Minor	2	1.2	3.6	kip ft	0.346	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	10.6	28.7	kip	0.368	✓ Pass
Combined Forces	1	-	-	-	0.842	✓ Pass

SC 12/24



SC 12/24

Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
4	floor	39' 10"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
3	floor	32' 10"	No		No	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

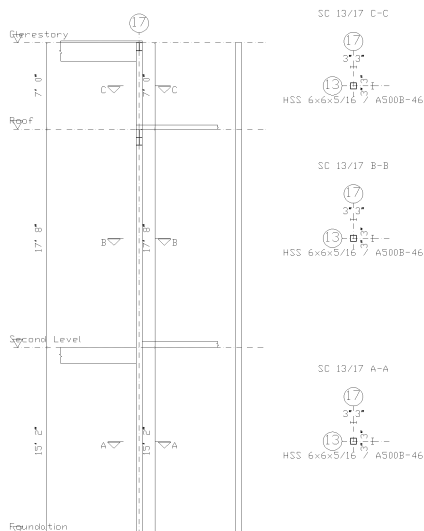
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
4	floor	39' 10"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
3	floor	32' 10"	Yes		No	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 6x6x0.25 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	-2.2	38.6	kip ft	0.057	✓ Pass
Flexure Minor	2	-3.9	38.6	kip ft	0.101	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	81.9	144.4	kip	0.567	✓ Pass
Combined Forces	2	-	-	-	0.707	✓ Pass

SC 13/17



SC 13/17

Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
4	floor	39' 10"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

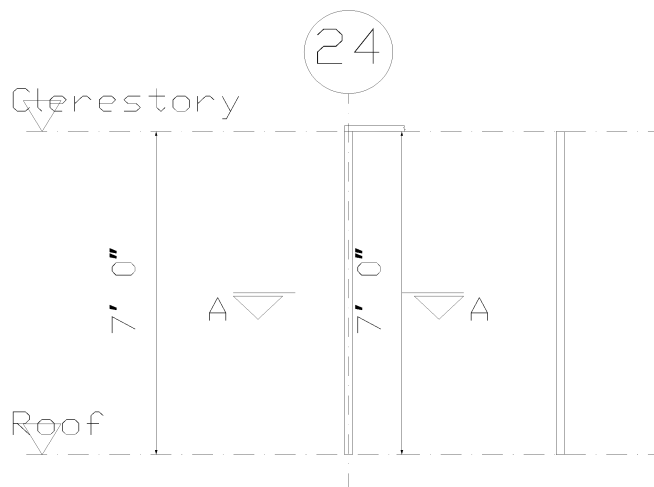
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
4	floor	39' 10"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
3	floor	32' 10"	Yes		Yes	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

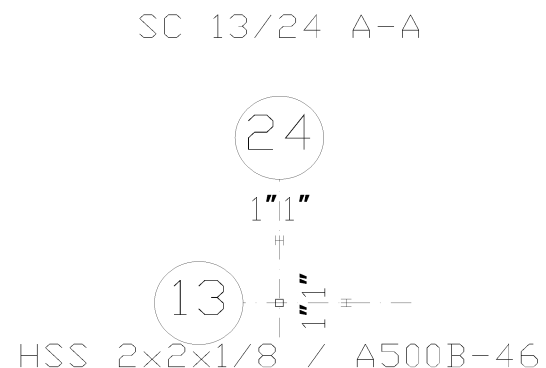
Summary HSS 6x6x5/16 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	10.2	46.9	kip ft	0.218	✓ Pass
Flexure Minor	2	3.3	46.9	kip ft	0.070	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	121.1	175.3	kip	0.691	✓ Pass
Combined Forces	2	-	-	-	0.946	✓ Pass

SC 13/24



SC 13/24



Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
2	floor	7' 0"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
1	floor	0"	No		No	

Strut Restraints

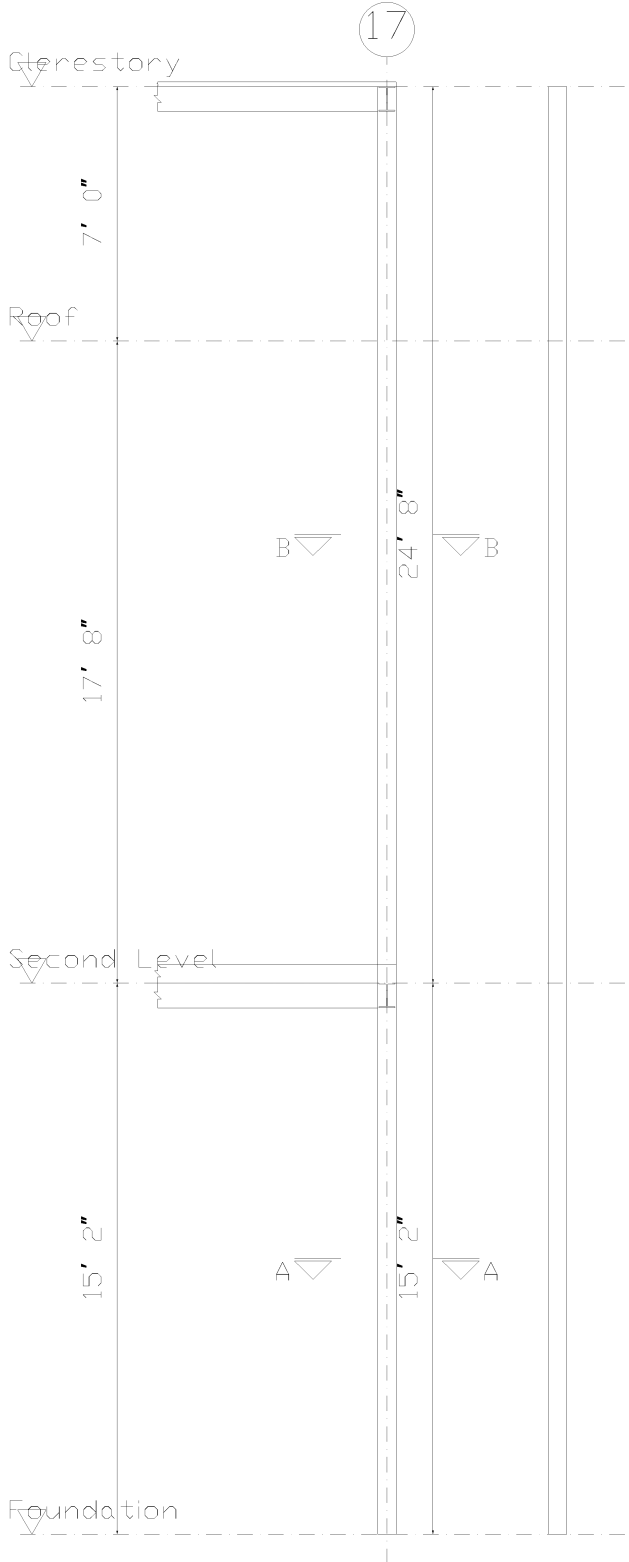
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
2	floor	7' 0"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
1	floor	0"	Yes		No	

Static Design Summary

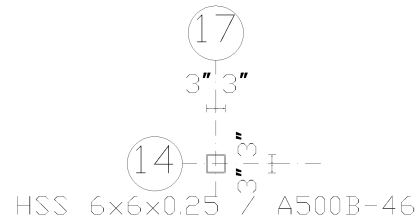
Summary HSS 2x2x1/8 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	No	Significant	Forces	kip ft	-	Not required
Flexure Minor	2	-1.2	2.0	kip ft	0.582	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	1	0.0	0.0	kip	0.000	⚠ Warning
Combined Forces	1	-	-	-	0.000	⚠ Warning

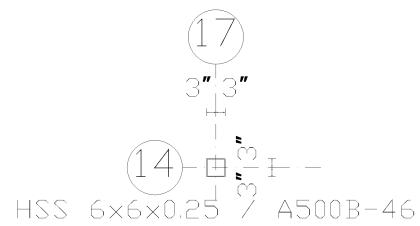
SC 14/17



SC 14/17 B-B



SC 14/17 A-A



SC 14/17

Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
3	floor	39' 10"	Yes		Yes	
	sub-beam	24' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

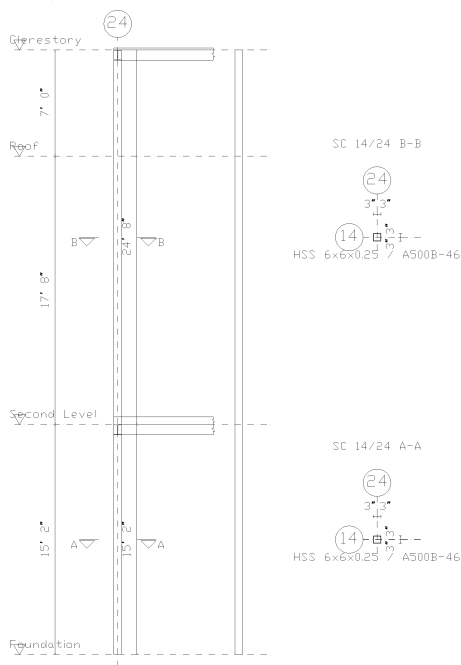
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
3	floor	39' 10"	Yes		Yes	
	sub-beam	24' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 6x6x0.25 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	2.1	38.6	kip ft	0.056	✓ Pass
Flexure Minor	2	2.2	38.6	kip ft	0.056	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	20.3	144.4	kip	0.141	✓ Pass
Combined Forces	2	-	-	-	0.182	✓ Pass

SC 14/24



SC 14/24

Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
3	floor	39' 10"	Yes		Yes	
	sub-beam	24' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

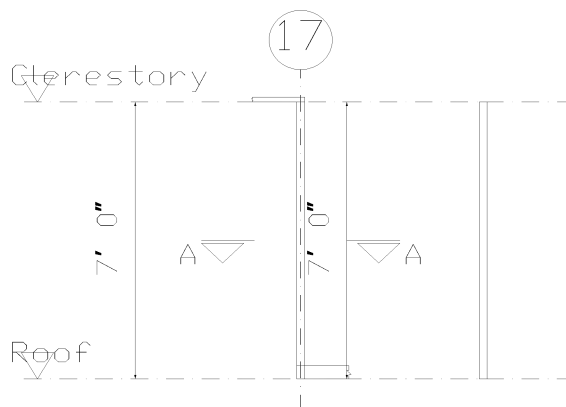
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
3	floor	39' 10"	Yes		Yes	
	sub-beam	24' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

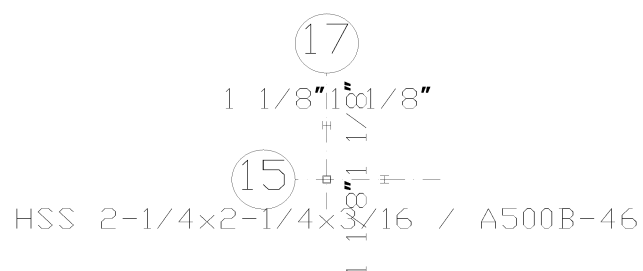
Summary HSS 6x6x0.25 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	2.1	38.6	kip ft	0.055	✓ Pass
Flexure Minor	2	-2.2	38.6	kip ft	0.057	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	20.3	144.4	kip	0.141	✓ Pass
Combined Forces	2	-	-	-	0.182	✓ Pass

SC 15/17



SC 15/17 A-A



SC 15/17

Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
2	floor	7' 0"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

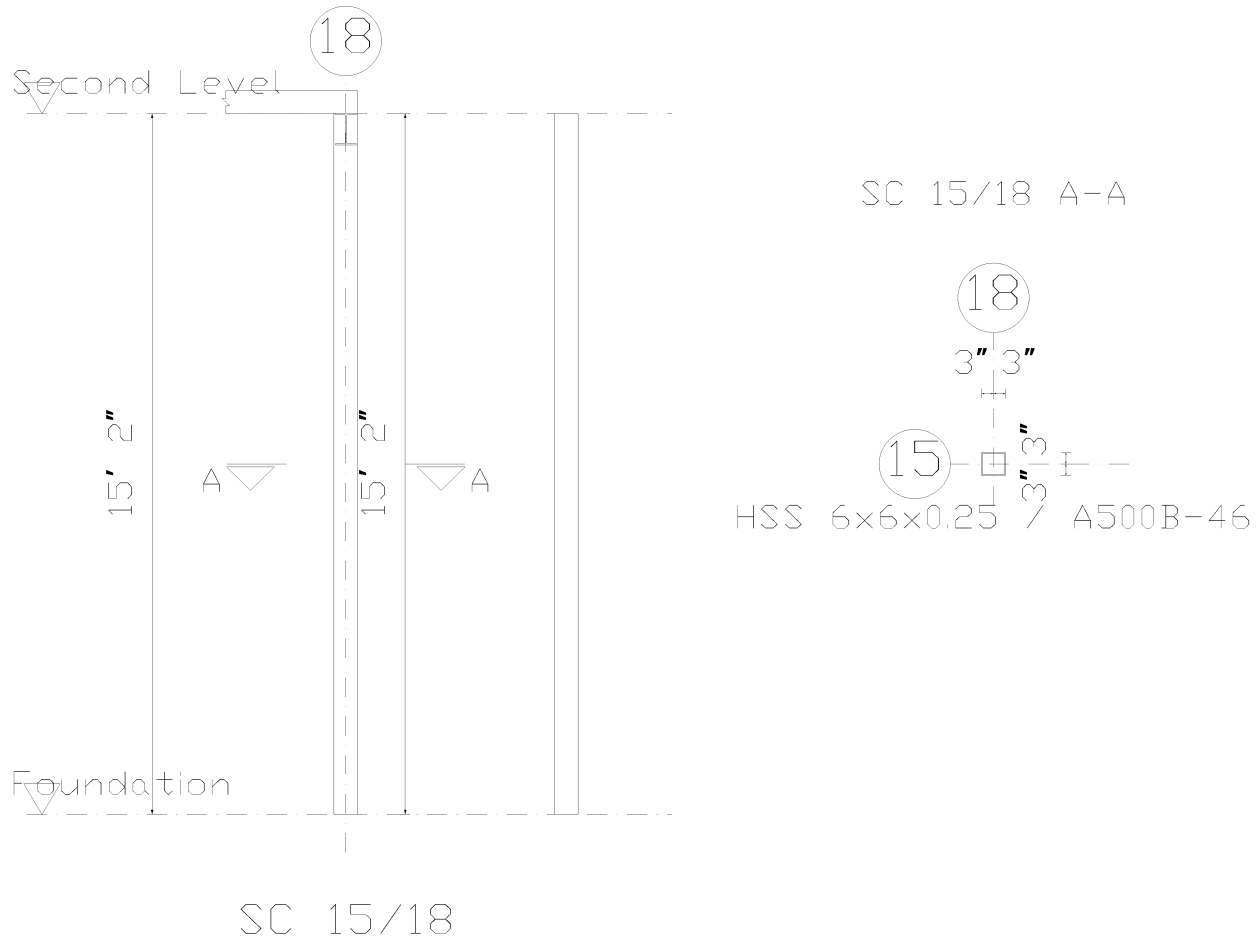
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
2	floor	7' 0"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 2-1/4x2-1/4x3/16 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	1	-0.4	3.6	kip ft	0.117	✓ Pass
Flexure Minor	2	1.3	3.6	kip ft	0.365	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	13.3	28.7	kip	0.464	✓ Pass
Combined Forces	1	-	-	-	0.892	✓ Pass

SC 15/18



Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

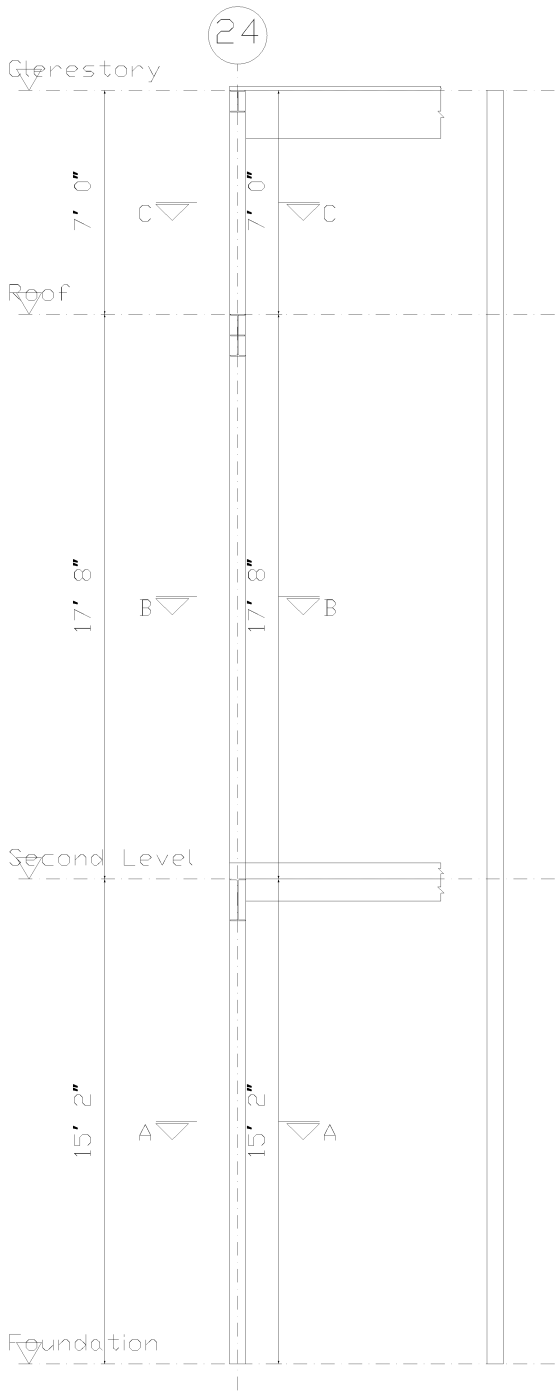
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

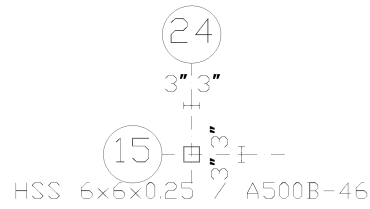
Summary HSS 6x6x0.25 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	-2.1	38.6	kip ft	0.054	✓ Pass
Flexure Minor	No	Significant	Forces	kip ft	-	Not required
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	24.8	144.4	kip	0.171	✓ Pass
Combined Forces	2	-	-	-	0.139	✓ Pass

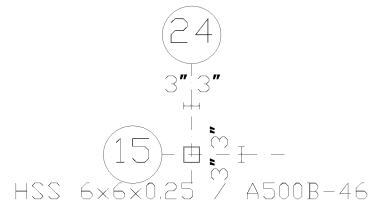
SC 15/24



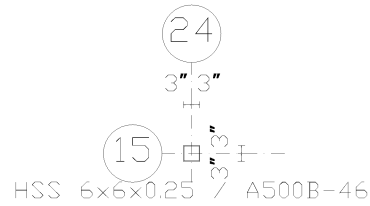
SC 15/24 C-C



SC 15/24 B-B



SC 15/24 A-A



SC 15/24

Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
4	floor	39' 10"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
3	floor	32' 10"	No		No	

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

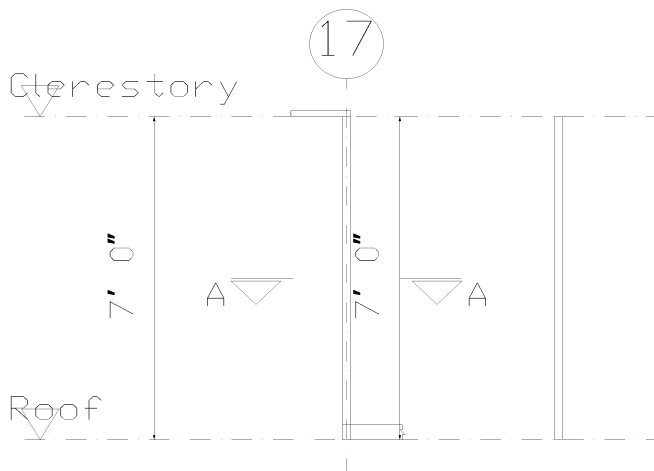
Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
4	floor	39' 10"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
3	floor	32' 10"	Yes		No	
	sub-beam	17' 8"	No	1.000	No	1.000
2	floor	15' 2"	Yes		Yes	
	sub-beam	15' 2"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 6x6x0.25 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	-6.1	38.6	kip ft	0.158	✓ Pass
Flexure Minor	1	-2.0	38.6	kip ft	0.051	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	2	44.2	144.4	kip	0.306	✓ Pass
Combined Forces	2	-	-	-	0.490	✓ Pass

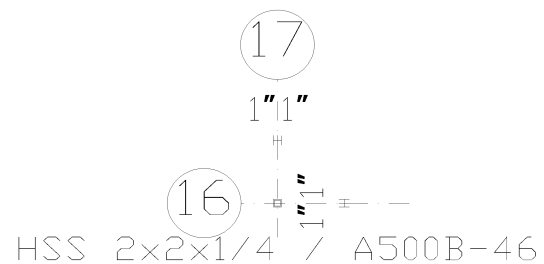
SC 16/17



SC 16/17

Lateral Restraints

SC 16/17 A-A



Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
2	floor	7' 0"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
2	floor	7' 0"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

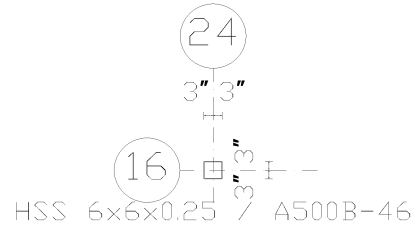
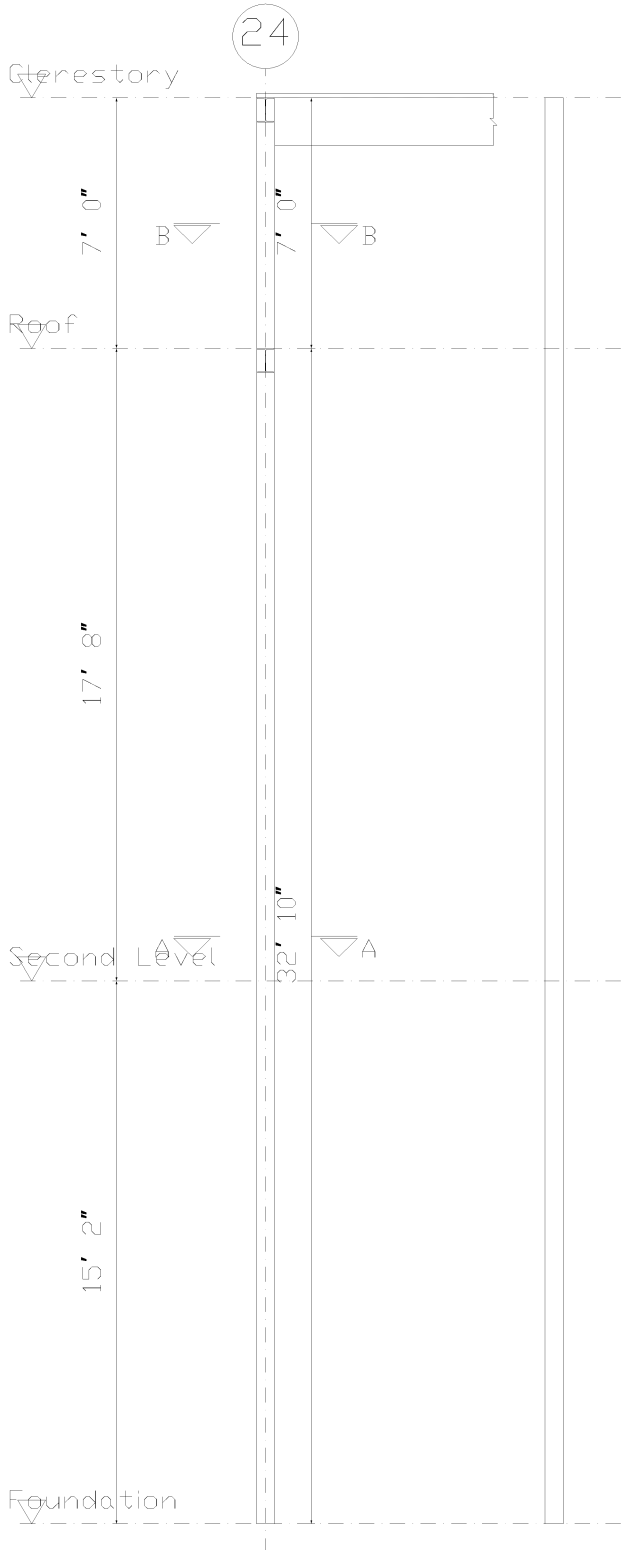
Static Design Summary

Summary HSS 2x2x1/4 (A500B-46)

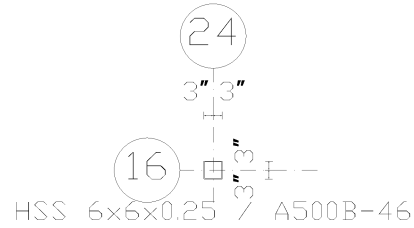
Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	1	-0.4	3.3	kip ft	0.113	✓ Pass
Flexure Minor	2	1.1	3.3	kip ft	0.321	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	1	11.2	24.0	kip	0.468	✓ Pass
Combined Forces	1	-	-	-	0.853	✓ Pass

SC 16/24

SC 16/24 B-B



SC 16/24 A-A



SC 16/24

Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained / Sub-stack continuous	Face C factor
3	floor	39' 10"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
2	floor	32' 10"	No		No	
	sub-beam	32' 10"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Strut Restraints

Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
3	floor	39' 10"	Yes		Yes	
	sub-beam	7' 0"	No	1.000	No	1.000
2	floor	32' 10"	Yes		No	
	sub-beam	32' 10"	No	1.000	No	1.000
1	floor	0"	Yes		Yes	

Static Design Summary

Summary HSS 6x6x0.25 (A500B-46)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Axial Classification	1	Non-slender	-	-	-	✓ Pass
Flexural Classification	1	Compact	-	-	-	✓ Pass
Shear Major	No	Significant	Forces	kip	-	Not required
Shear Minor	No	Significant	Forces	kip	-	Not required
Flexure Major	2	-0.6	38.6	kip ft	0.015	✓ Pass
Flexure Minor	1	-1.7	38.6	kip ft	0.043	✓ Pass
Axial Tension	No	Significant	Forces	kip	-	Not required
Axial Compression	1	12.3	28.4	kip	0.433	✓ Pass
Combined Forces	2	-	-	-	0.485	✓ Pass

 J&S STRUCTURAL ENGINEERS 6640 W 143 rd St Suite 250 Overland Park, KS 66223 913.549.4701	Project				Job Ref.	
	Lateral North End				Sheet no./rev.	
	Section				1	
	Calc. by	Date	Chk'd by	Date	App'd by	Date
	K	9/19/2024				

Lateral Analysis:

Upper Roof:

Max X Direction:: $X_{cs} = 32.0$ ft;

Max Y Direction:: $Y_{cs} = 95.34$ ft;

Height:: $H = 5$ ft;

Seismic:

;Cs = .01;

;wt_{roof} = 25 psf;

;wt_{wall} = 10 psf;

;Vs_x = Cs × ((wt_{roof} × X_{cs} × Y_{cs}) + (wt_{wall} × 2 × Y_{max} × H/2)) = **0.79** kips;

;Vs_y = Cs × ((wt_{roof} × X_{max} × Y_{max}) + (wt_{wall} × 2 × X_{max} × H/2)) = **0.32** kips;

Wind:

;wind = 26.5 psf;

Vw_x = (wind × H/2) × Y_{max} = **3.38** kips;

;Vw_y = (wind × H/2) × X_{max} = **1.61** kips;

See Enercalc for lateral loads distributed through cantilevered columns.

Roof:

Max X Direction:: $X_{cs} = 93.33$ ft;

Max Y Direction:: $Y_{cs} = 90$ ft;

Height:: $H_R = 16.0$ ft;

Parapet Height:: $H_P = 2.67$ ft;

Seismic:

;Cs = .01;

;wt_{roof} = 25 psf;

;wt_{wall} = 10 psf;

See Excel Sheet

;Vs_{rx} = 2.3 kips;

;Vs_{ry} = 2.5 kips;

Wind:

;wind = 26.43 psf;

Vw_x = ((wind × H_R/2) + (wind × 1.5 × H_P)) × Y_{cs} = **28.56** kips;

;Vw_y = ((wind × H_R/2) + (wind × 1.5 × H_P)) × X_{cs} = **29.61** kips;



**J&S STRUCTURAL
ENGINEERS**

6640 W 143rd St Suite 250
Overland Park, KS 66223
913.549.4701

Project				Job Ref.	
Lateral North End					
Section				Sheet no./rev.	
				2	
Calc. by	Date	Chk'd by	Date	App'd by	Date
K	9/19/2024				

Floor

Height;;H = 15.33 ft;

Seismic:

;Cs = .01;

;wt_{floor}= 25 psf;

;wt_{wall} = 10 psf;

See Excel Sheet Level 1

;Vs_{fx} = 5.0 kips;

;Vs_{fy} = 5.2 kips;

Wind:

;wind = 26.43 psf;

Vw_x = ((wind × H_R/2) + (wind × H/2)) × Y_{cs} = **37.26** kips;

;Vw_y = ((wind × H_R/2) + (wind × H/2)) × X_{cs} = **38.64** kips;

CENTER OF MASS

Upper Level	L (ft)	W (ft)	Ht (ft)	Wt (ksf)	X (ft)	Y (ft)	Weight (kips)	WT x X (kip-ft)	WT x Y (kip-ft)
A1	90.00	93.33		0.025	49.000	46.665	210	10290	9799
A2	9.33	8		0.025	4.000	51.000	2	7	95
X1	93.33		18.67	0.01	49.000	90.000	17	854	1568
X2	8.00		18.67	0.055	4.000	56.000	8	33	460
X3	8.00		18.67	0.055	4.000	46.000	8	33	378
X4	93.33		18.67	0.01	49.000	0.000	17	854	0
Y1	9.33		18.67	0.01	0.000	51.000	2	0	89
Y2	9.33		18.67	0.01	8.000	51.000	2	14	89
Y3	90.00		18.67	0.01	93.330	45.000	17	1568	756
							283	13653	13234

Xmax=	101.330
Ymax=	90.000

X=	48.17016
Y=	46.69468

CENTER OF MASS

Lower Level	L (ft)	W (ft)	Ht (ft)	Wt (ksf)	X (ft)	Y (ft)	Weight (kips)	WT x X (kip-ft)	WT x Y (kip-ft)
A1	90.00	93.33		0.057	67.670	46.665	479	32399	22342
A2	9.33	8		0	22.670	51.000	0	0	0
A3	55.50	26.67		0.057	22.670	51.000	84	1913	4303
X1	93.33		15.33	0.01	67.670	90.000	14	968	1288
X2	8.00		15.33	0.055	22.670	56.000	7	153	378
X3	8.00		15.33	0.055	22.670	46.000	7	153	310
X4	93.33		15.33	0.01	67.670	0.000	14	968	0
Y1	9.33		15.33	0.01	18.670	51.000	1	27	73
Y2	9.33		15.33	0.01	26.670	51.000	1	38	73
Y3	90.00		15.33	0.01	112.000	45.000	14	1545	621
							622	38164	29388

Xmax=	120.000
Ymax=	90.000

X=	61.36554
Y=	47.25352

Vertical Distribution of Seismic Forces (X):					Vertical Distribution of Seismic Forces (Y):				
Level	w(x) kips	h(x) ft	w(x)h(x) ft-kips	F(x) kips	Level	w(y) kips	h(y) ft	w(y)h(y) ft-kips	F(y) kips
1	495	14.67	7268	5.0	1	605	14.67	8879	6.1
2	232	34.67	8048	2.3	2	246	34.67	8519	2.5
	728		15317	7.3		851		17398	8.5

Project Title:
Engineer:
Project ID:
Project Descr:

General Beam Analysis

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

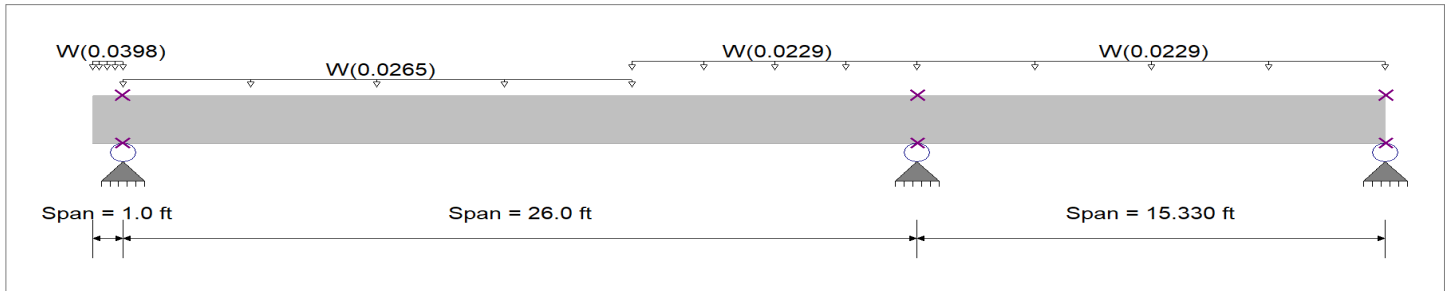
J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Clerestory Y

General Beam Properties

Elastic Modulus	29,000.0 ksi				
Span #1	Span Length =	1.0 ft	Area =	10.0 in ²	Moment of Inertia = 100.0 in ⁴
Span #2	Span Length =	26.0 ft	Area =	10.0 in ²	Moment of Inertia = 100.0 in ⁴
Span #3	Span Length =	15.330 ft	Area =	10.0 in ²	Moment of Inertia = 100.0 in ⁴



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Load for Span Number 1

Uniform Load : $W = 0.03980$ k/ft, Tributary Width = 1.0 ft

Load for Span Number 2

Uniform Load : $W = 0.02650$ k/ft, Extent = 0.0 --> 16.670 ft, Tributary Width = 1.0 ft

Uniform Load : $W = 0.02290$ k/ft, Extent = 16.670 --> 26.0 ft, Tributary Width = 1.0 ft

Load for Span Number 3

Uniform Load : $W = 0.02290$ k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Maximum Bending =	0.951 k-ft	Maximum Shear =	0.2263 k
Load Combination	+0.60W	Load Combination	+0.60W
Span # where maximum occurs	Span # 2	Span # where maximum occurs	Span # 2
Location of maximum on span	26.000 ft	Location of maximum on span	26.000 ft
Maximum Deflection			
Max Downward Transient Deflection	0.052 in	6021	
Max Upward Transient Deflection	-0.007 in	3434	
Max Downward Total Deflection	0.031 in	10036	
Max Upward Total Deflection	-0.004 in	5726	

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values (k-ft)						Shear Values (k)	
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma - Max	Mnx	Mnx/Omega Cb	Rm	Va Max	VnxVnx/Omega
Overall MAXimum Envelope											
Dsgn. L = 1.00 ft	1				-0.01	0.01				0.17	
Dsgn. L = 26.00 ft	2			0.86	-0.95	0.95				0.23	
Dsgn. L = 15.33 ft	3			0.07	-0.95	0.95				0.17	
Dsgn. L = 1.00 ft	1									-0.00	
Dsgn. L = 26.00 ft	2									-0.00	
Dsgn. L = 15.33 ft	3									-0.00	
+0.60W											
Dsgn. L = 1.00 ft	1				-0.01	0.01				0.17	
Dsgn. L = 26.00 ft	2			0.86	-0.95	0.95				0.23	
Dsgn. L = 15.33 ft	3			0.07	-0.95	0.95				0.17	
+0.450W											
Dsgn. L = 1.00 ft	1				-0.01	0.01				0.13	
Dsgn. L = 26.00 ft	2			0.65	-0.71	0.71				0.17	
Dsgn. L = 15.33 ft	3			0.05	-0.71	0.71				0.13	

Project Title:
Engineer:
Project ID:
Project Descr:

General Beam Analysis

Project File: LS JOC 2.ec6
(c) ENERCALC, LLC 1982-2024

LIC# : KW-06017929, Build:20.24.09.03 J&S STRUCTURAL ENGINEERS, P.A.

DESCRIPTION: Clerestory Y

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
W Only	1	0.0000	0.000	W Only	-0.0070	0.000
	2	0.0518	11.848		0.0000	0.000
	3	0.0000	11.848	W Only	-0.0055	4.657

Vertical Reactions

Support notation : Far left is #1					Values in KIPS	
Load Combination	Support 1	Support 2	Support 3	Support 4		
Overall MAXimum		0.318	0.656	0.072		
Overall MINimum						
+0.60W		0.191	0.394	0.043		
+0.450W		0.143	0.295	0.032		
W Only		0.318	0.656	0.072		

Project Title:
 Engineer:
 Project ID:
 Project Descr:

General Beam Analysis

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.08.01

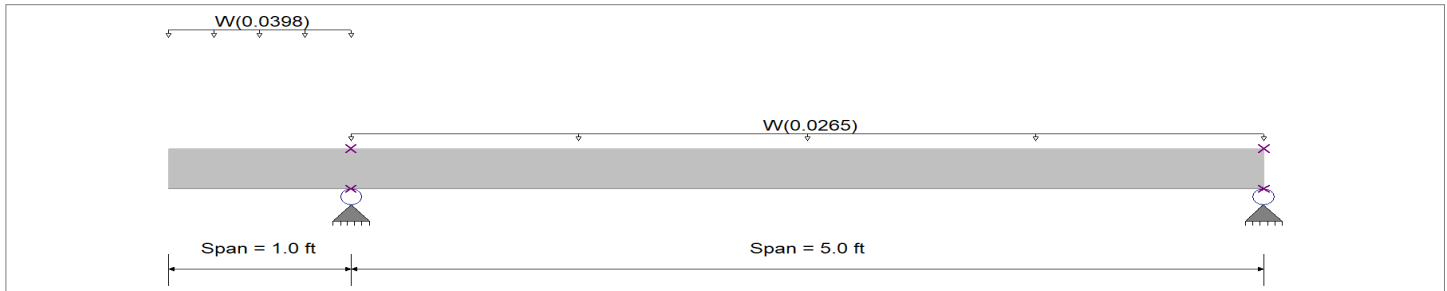
J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC INC 1983-2023

DESCRIPTION: Clerestory X

General Beam Properties

Elastic Modulus	29,000.0 ksi				
Span #1	Span Length =	1.0 ft	Area =	10.0 in^2	Moment of Inertia = 100.0 in^4
Span #2	Span Length =	5.0 ft	Area =	10.0 in^2	Moment of Inertia = 100.0 in^4



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Load for Span Number 1

Uniform Load : $W = 0.03980$ k/ft, Tributary Width = 1.0 ft

Load for Span Number 2

Uniform Load : $W = 0.02650$ k/ft, Extent = 0.0 --> 5.0 ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Maximum Bending =	0.044 k-ft	Maximum Shear =	0.04214 k
Load Combination	+0.60W	Load Combination	+0.60W
Span # where maximum occurs	Span # 2	Span # where maximum occurs	Span # 1
Location of maximum on span	2.654 ft	Location of maximum on span	1.000 ft
Maximum Deflection			
Max Downward Transient Deflection	0.000 in		0
Max Upward Transient Deflection	0.000 in		0
Max Downward Total Deflection	0.000 in		898845
Max Upward Total Deflection	-0.000 in		672278

Maximum Forces & Stresses for Load Combinations

Load Combination		Span #	Max Stress Ratios		Summary of Moment Values (k-ft)						Shear Values (k)	
Segment Length			M	V	Mmax +	Mmax -	Ma - Max	Mnx	Mnx/Omega Cb	Rm	Va Max	VnxVnx/Omega
Overall MAXimum Envelope												
Dsgn. L = 1.00 ft	1					-0.01	0.01				0.04	
Dsgn. L = 5.00 ft	2				0.04	-0.01	0.04				0.04	
Dsgn. L = 1.00 ft	1										-0.00	
Dsgn. L = 5.00 ft	2										-0.00	
+0.60W												
Dsgn. L = 1.00 ft	1					-0.01	0.01				0.04	
Dsgn. L = 5.00 ft	2				0.04	-0.01	0.04				0.04	
+0.450W												
Dsgn. L = 1.00 ft	1					-0.01	0.01				0.03	
Dsgn. L = 5.00 ft	2				0.03	-0.01	0.03				0.03	

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
W Only	1	0.0000	0.000	W Only	-0.0001	0.000
	2	0.0001	2.577		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum		0.110	0.062
Overall MINimum			
+0.60W		0.066	0.037
+0.450W		0.050	0.028
W Only		0.110	0.062

Project Title:
 Engineer:
 Project ID:
 Project Descr:

General Beam Analysis

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.08.01

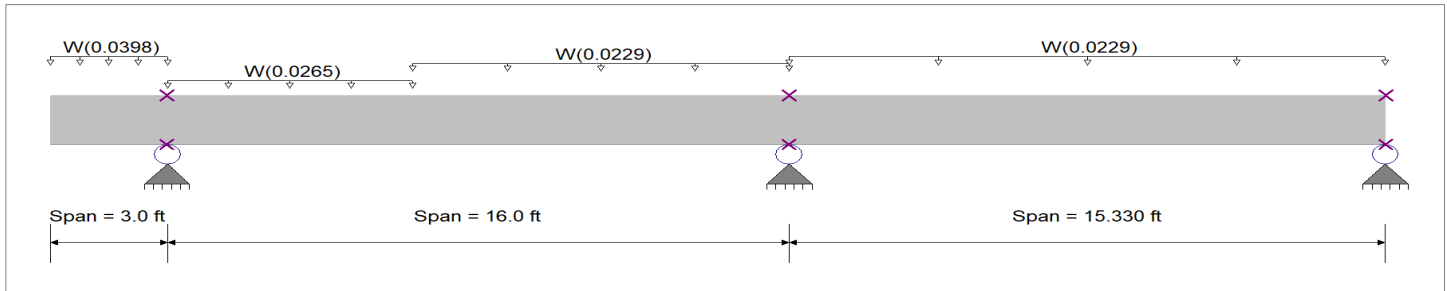
J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC INC 1983-2023

DESCRIPTION: Roof Framing

General Beam Properties

Elastic Modulus	29,000.0 ksi				
Span #1	Span Length =	3.0 ft	Area =	10.0 in ²	Moment of Inertia = 100.0 in ⁴
Span #2	Span Length =	16.0 ft	Area =	10.0 in ²	Moment of Inertia = 100.0 in ⁴
Span #3	Span Length =	15.330 ft	Area =	10.0 in ²	Moment of Inertia = 100.0 in ⁴



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Load for Span Number 1

Uniform Load : $W = 0.03980$ k/ft, Tributary Width = 1.0 ft

Load for Span Number 2

Uniform Load : $W = 0.02650$ k/ft, Extent = 0.0 -->> 6.330 ft, Tributary Width = 1.0 ft

Uniform Load : $W = 0.02290$ k/ft, Extent = 6.330 -->> 16.0 ft, Tributary Width = 1.0 ft

Load for Span Number 3

Uniform Load : $W = 0.02290$ k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Maximum Bending =	0.405 k-ft	Maximum Shear =	0.1317 k
Load Combination	+0.60W	Load Combination	+0.60W
Span # where maximum occurs	Span # 2	Span # where maximum occurs	Span # 2
Location of maximum on span	16.000 ft	Location of maximum on span	16.000 ft
Maximum Deflection			
Max Downward Transient Deflection	0.004 in	44464	
Max Upward Transient Deflection	-0.002 in	31812	
Max Downward Total Deflection	0.003 in	74107	
Max Upward Total Deflection	-0.001 in	53020	

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values (k-ft)					Shear Values (k)	
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma - Max	Mnx Mnx/Omega Cb	Rm	Va Max	VnxVnx/Omega
Overall MAXimum Envelope										
Dsgn. L = 3.00 ft	1				-0.11	0.11			0.10	
Dsgn. L = 16.00 ft	2			0.22	-0.40	0.40			0.13	
Dsgn. L = 15.33 ft	3			0.23	-0.40	0.40			0.13	
Dsgn. L = 3.00 ft	1								-0.00	
Dsgn. L = 16.00 ft	2								-0.00	
Dsgn. L = 15.33 ft	3								-0.00	
+0.60W										
Dsgn. L = 3.00 ft	1				-0.11	0.11			0.10	
Dsgn. L = 16.00 ft	2			0.22	-0.40	0.40			0.13	
Dsgn. L = 15.33 ft	3			0.23	-0.40	0.40			0.13	
+0.450W										
Dsgn. L = 3.00 ft	1				-0.08	0.08			0.08	
Dsgn. L = 16.00 ft	2			0.17	-0.30	0.30			0.10	
Dsgn. L = 15.33 ft	3			0.17	-0.30	0.30			0.10	

Project Title:
Engineer:
Project ID:
Project Descr:

General Beam Analysis

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.08.01 J&S STRUCTURAL ENGINEERS, P.A. (c) ENERCALC INC 1983-2023

DESCRIPTION: Roof Framing

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	W Only	-0.0023	0.000
W Only	2	0.0043	7.089		0.0000	0.000
W Only	3	0.0041	8.926		0.0000	0.000

Vertical Reactions

Vertical Reactions			Support notation : Far left is #1		Values in KIPS
Load Combination	Support 1	Support 2	Support 3	Support 4	
Overall MAXimum		0.290	0.438	0.132	
Overall MINimum					
+0.60W		0.174	0.263	0.079	
+0.450W		0.130	0.197	0.059	
W Only		0.290	0.438	0.132	

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Torsional Analysis of Rigid Diaphragm

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: North End Roof Wind

General Information

IBC 2018, CBC 2019, ASCE 7-16

Applied Lateral Force in "X" Direction	28.60 k	Center of Shear Application :	
Applied Lateral Force in "Y" Direction	29.610 k	Distance from "X" datum point	48.170 ft
		Distance from "Y" datum point	46.70 ft
Note: These loads are resolved into X & Y components when applied to the system of elements at angular increment			
		Accidental Torsion values per ASCE 7-05 12.8.4.2	
		Ecc. as % of Maximum Dimension	5.00 %
Load Orientation Angular Increment	15.0 deg	Maximum Dimensions :	
Load Location Angular Increment	30.0 deg	Along "X" Axis	101.330 ft
		Along "Y" Axis	90.0 ft
Center of Rigidity Location (calculated) . . .			
"X" dist. from Datum	13.328 ft		
"Y" dist. from Datum	52.525 ft		
		Accidental Eccentricity +/- from "Y" Coord. of Center of Load Application :	5.067 ft
		Accidental Eccentricity +/- from "X" Coord. of Center of Load Application :	4.50 ft

Wall Information

Label : X2	X Wall C.G. Location	4 ft	Length	8 ft
	Y Wall C.G. Location	55.33 ft	Height	18.67 ft
Wall Deflections (Stiffness) for 1.0 kip load :	Wall Angle CCW	0 deg	Thickness	12 in
Along Wall "y" Dir 4.4702E-003 in	Wall Fixity	Fix-Pin	E - Bending	1 Mpsi
Along Wall "x" Dir 6.8023E-002 in			E - Shear	1 Mpsi
Label : X3	X Wall C.G. Location	4 ft	Length	8 ft
	Y Wall C.G. Location	46 ft	Height	18.67 ft
Wall Deflections (Stiffness) for 1.0 kip load :	Wall Angle CCW	0 deg	Thickness	12 in
Along Wall "y" Dir 4.4702E-003 in	Wall Fixity	Fix-Pin	E - Bending	1 Mpsi
Along Wall "x" Dir 6.8023E-002 in			E - Shear	1 Mpsi
Label : Y2	X Wall C.G. Location	8 ft	Length	9.33 ft
	Y Wall C.G. Location	51 ft	Height	18.67 ft
Wall Deflections (Stiffness) for 1.0 kip load :	Wall Angle CCW	90 deg	Thickness	12 in
Along Wall "y" Dir 2.8711E-003 in	Wall Fixity	Fix-Pin	E - Bending	1 Mpsi
Along Wall "x" Dir 5.8326E-002 in			E - Shear	1 Mpsi

Generic Resisting Elements

Generic Resisting Element Deflections (Stiffness) for constant load :

Label : FRAME y	Element X Location	32.5 ft	Element "y" direction defl per kip =	0.0090 in
	Element Y Location	44 ft	Element "x" direction defl per kip =	0.0000 in
	Element Angle CCW	90 deg		
Label : FRAME X	Element X Location	40.5 ft	Element "y" direction defl per kip =	0.0090 in
	Element Y Location	60.25 ft	Element "x" direction defl per kip =	0.0000 in
	Element Angle CCW	0 deg		

ANALYSIS SUMMARY

Maximum shear forces applied to resisting elements. Eccentricity with respect to Center of Rigidity

Max Shear along Member Local "y-y" Axis					Max Shear along Member Local "x-x" Axis			
Resisting Element	Load Angle	X-Ecc (ft)	Y-Ecc (ft)	Shear Force (k)	Load Angle	X-Ecc (ft)	Y-Ecc (ft)	Shear Force (k)
FRAME y	75	-34.84	-10.33	38.583	285	-29.78	-5.83	0.000
FRAME X	90	-39.91	-5.83	14.237	90	-29.78	-5.83	0.000
X2	0	-29.78	-5.83	11.114	90	-39.91	-5.83	3.165
X3	240	-39.23	-8.08	28.534	90	-39.91	-5.83	3.165
Y2	90	-39.91	-5.83	51.882	210	-37.37	-9.72	1.029

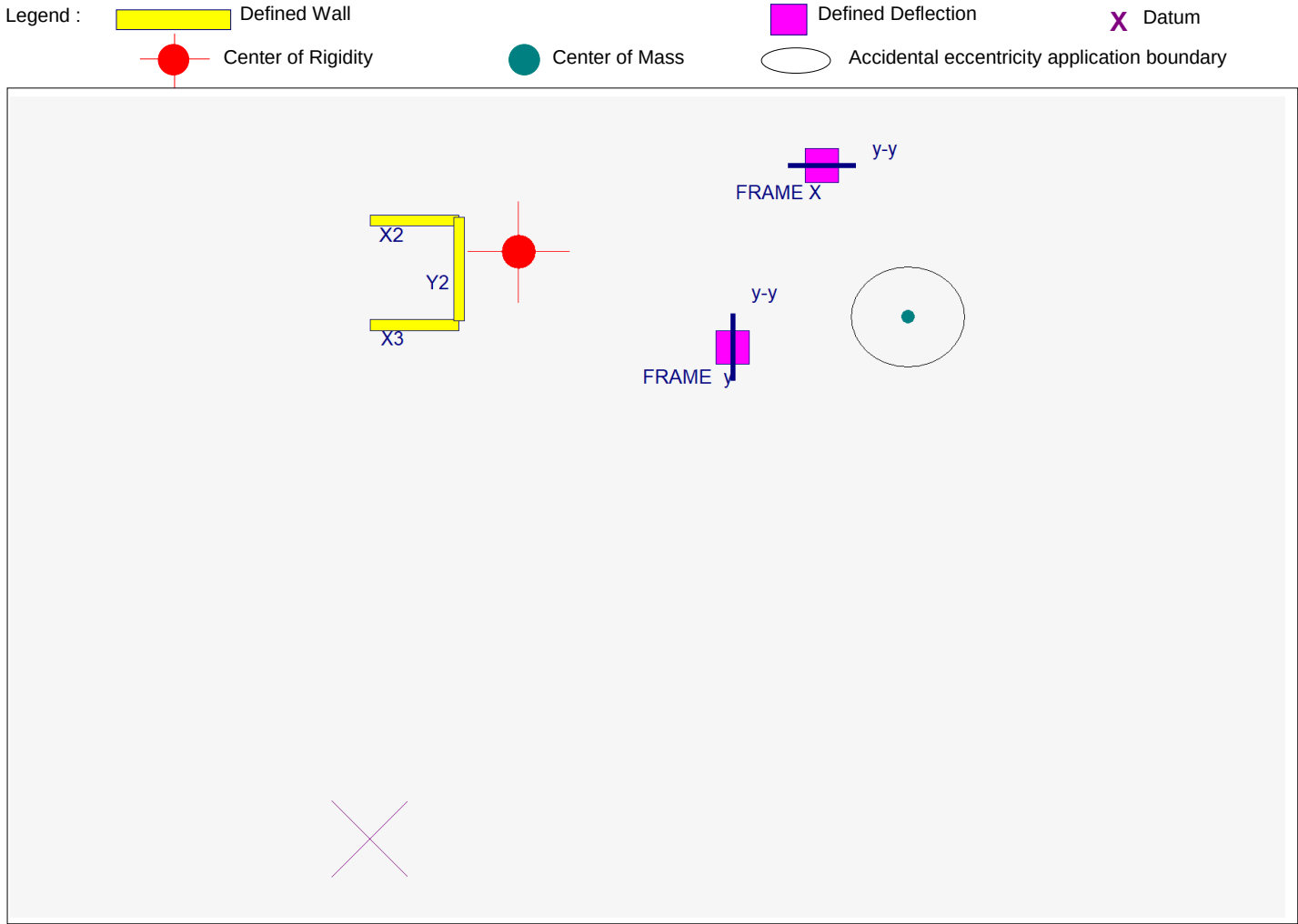
Torsional Analysis of Rigid Diaphragm

Project File: LS JOC 2.ec6
(c) ENERCALC, LLC 1982-2024

LIC# : KW-06017929, Build:20.24.09.03 J&S STRUCTURAL ENGINEERS, P.A.

DESCRIPTION: North End Roof Wind

Layout of Resisting Elements



Project Title:
Engineer:
Project ID:
Project Descr:

Torsional Analysis of Rigid Diaphragm

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: North End Roof Wind

Analysis Notes

This program is designed to distribute an applied shear load to a set of resisting elements.

Each resisting element data entry specifies a deflection along a "major" and "minor" axis due to a 1,000 lb load. Each resisting element may be entered as a wall or a column (whereby the deflection is calculated), or as a generic resisting element with specified deflection. The deflections define the stiffness of each resisting element.

Each resisting element is defined at an (X,Y) location from a datum the user has previously defined. A counter-clockwise rotation of the element can be entered with respect to a traditional "+X" axis line.

A main "shear" load and an optional orthogonal shear load are specified for distribution to the system of resisting elements. In addition the maximum orthogonal dimensions of the structure and minimum accidental eccentricity percentage are specified.

From the entered loads the program calculates resultant force vectors for each angular orientation that is requested. The force is applied to the resisting elements in angular increments to generate a series of resulting direct and torsional shear loads on each element. This application of force is then repeated at angular intervals along an elliptical path defined by the minimum accidental eccentricity.

The end result is a table of direct shear and torsional shear values for each element from the iterated angles of load application and accidental eccentricity. These values are then searched to find the maximum major and minor axis shears applied to each resisting element.

Project Title:
Engineer:
Project ID:
Project Descr:

Torsional Analysis of Rigid Diaphragm

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: North End Floor Wind

General Information

IBC 2018, CBC 2019, ASCE 7-16

Applied Lateral Force in "X" Direction	37.30 k	Center of Shear Application :	
Applied Lateral Force in "Y" Direction	38.640 k	Distance from "X" datum point	61.370 ft
		Distance from "Y" datum point	47.250 ft
Note: These loads are resolved into X & Y components when applied to the system of elements at angular increment		Accidental Torsion values per ASCE 7-05 12.8.4.2	
		Ecc. as % of Maximum Dimension	5.00 %
Load Orientation Angular Increment	15.0 deg	Maximum Dimensions :	
Load Location Angular Increment	30.0 deg	Along "X" Axis	120.0 ft
		Along "Y" Axis	90.0 ft
Center of Rigidity Location (calculated) . . .			
"X" dist. from Datum	28.857 ft		
"Y" dist. from Datum	51.232 ft		
		Accidental Eccentricity +/- from "Y" Coord. of Center of Load Application :	6.0 ft
		Accidental Eccentricity +/- from "X" Coord. of Center of Load Application :	4.50 ft

Wall Information

Label : X2	X Wall C.G. Location	22.67 ft	Length	8 ft
	Y Wall C.G. Location	55.33 ft	Height	15.33 ft
	Wall Deflections (Stiffness) for 1.0 kip load :		Thickness	8 in
	Along Wall "y" Dir 1.2515E-003 in	0 deg	E - Bending	1.3 Mpsi
	Along Wall "x" Dir 9.8003E-002 in	Fix-Fix	E - Shear	0.5 Mpsi
Label : X3	X Wall C.G. Location	22.67 ft	Length	8 ft
	Y Wall C.G. Location	46 ft	Height	15.33 ft
	Wall Deflections (Stiffness) for 1.0 kip load :		Thickness	8 in
	Along Wall "y" Dir 1.2294E-003 in	0 deg	E - Bending	1.3 Mpsi
	Along Wall "x" Dir 9.7981E-002 in	Fix-Fix	E - Shear	0.52 Mpsi
Label : Y1	X Wall C.G. Location	18.67 ft	Length	4.67 ft
	Y Wall C.G. Location	58 ft	Height	15.33 ft
	Wall Deflections (Stiffness) for 1.0 kip load :		Thickness	8 in
	Along Wall "y" Dir 4.9141E-003 in	90 deg	E - Bending	1 Mpsi
	Along Wall "x" Dir 2.1746E-001 in	Fix-Fix	E - Shear	1 Mpsi
Label : Y2	X Wall C.G. Location	26.67 ft	Length	9.33 ft
	Y Wall C.G. Location	51 ft	Height	15.33 ft
	Wall Deflections (Stiffness) for 1.0 kip load :		Thickness	8 in
	Along Wall "y" Dir 9.0050E-004 in	90 deg	E - Bending	1.3 Mpsi
	Along Wall "x" Dir 8.4014E-002 in	Fix-Fix	E - Shear	0.52 Mpsi

Generic Resisting Elements

Generic Resisting Element Deflections (Stiffness) for constant load :

Label : FRAME y	Element X Location	52 ft	Element "y" direction defl per kip =	0.0050 in
	Element Y Location	43.5 ft	Element "x" direction defl per kip =	0.0000 in
	Element Angle CCW	90 deg		
Label : FRAME X	Element X Location	60 ft	Element "y" direction defl per kip =	0.0050 in
	Element Y Location	56 ft	Element "x" direction defl per kip =	0.0000 in
	Element Angle CCW	0 deg		

ANALYSIS SUMMARY

Maximum shear forces applied to resisting elements. Eccentricity with respect to Center of Rigidity

Max Shear along Member Local "y-y" Axis					Max Shear along Member Local "x-x" Axis			
Resisting Element	Load Angle	X-Ecc (ft)	Y-Ecc (ft)	Shear Force (k)	Load Angle	X-Ecc (ft)	Y-Ecc (ft)	Shear Force (k)
FRAME y	75	-32.51	-8.48	39.170	285	-26.51	-3.98	0.000
FRAME X	90	-38.51	-3.98	8.119	90	-26.51	-3.98	0.000
X2	90	-38.51	-3.98	27.879	90	-38.51	-3.98	0.795
X3	240	-37.71	-6.23	41.854	90	-38.51	-3.98	0.795
Y1	90	-38.51	-3.98	22.776	90	-38.51	-3.98	0.265
Y2	90	-38.51	-3.98	48.648	0	-32.51	-8.48	0.248

Torsional Analysis of Rigid Diaphragm

Project File: LS JOC 2.ec6
(c) ENERCALC, LLC 1982-2024

LIC# : KW-06017929, Build:20.24.09.03
J&S STRUCTURAL ENGINEERS, P.A.

DESCRIPTION: North End Floor Wind

Layout of Resisting Elements

Legend :

Defined Wall

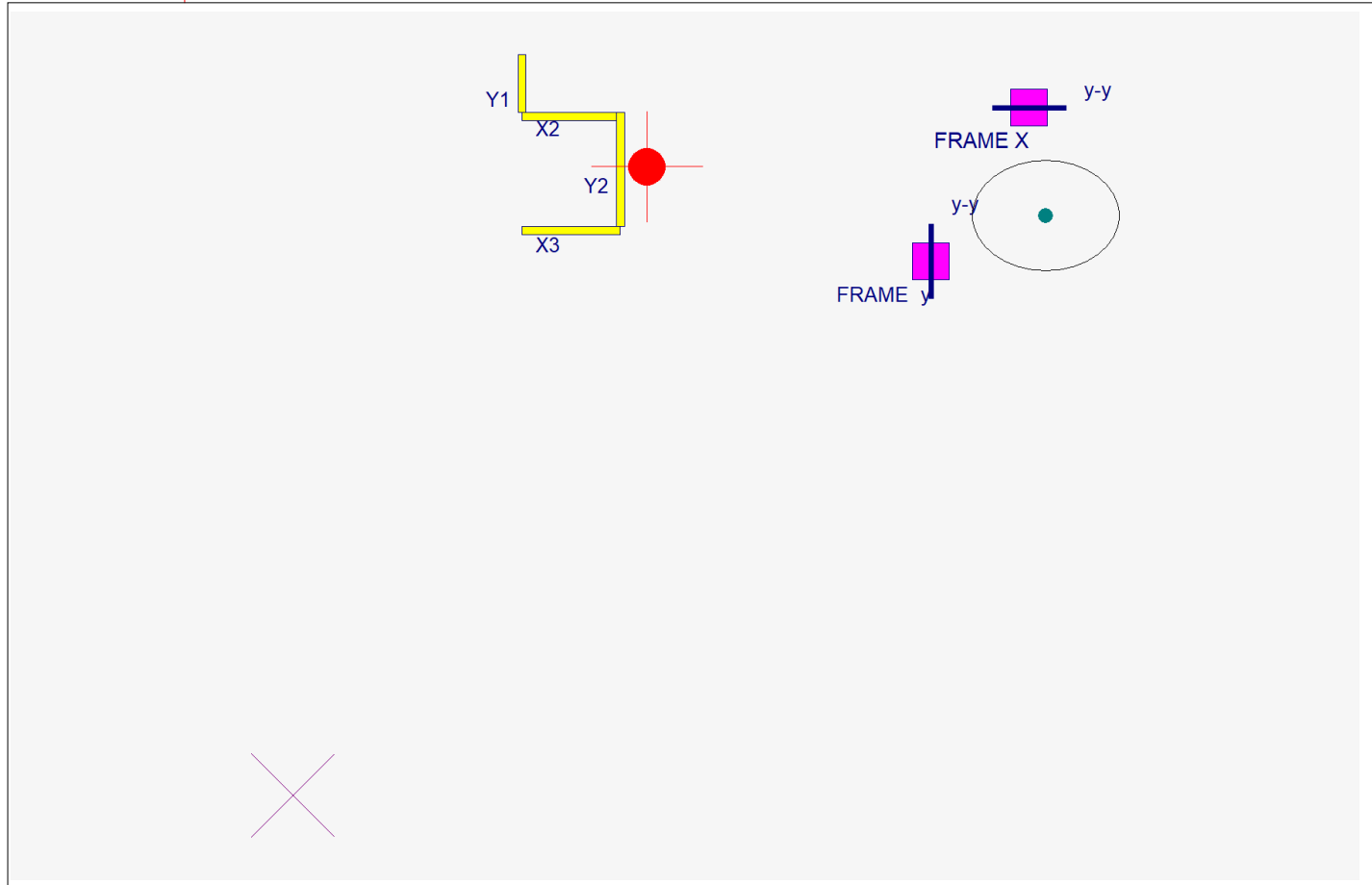
Center of Rigidity

Center of Mass

Defined Deflection

Accidental eccentricity application boundary

Datum



Project Title:
Engineer:
Project ID:
Project Descr:

Torsional Analysis of Rigid Diaphragm

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: North End Floor Wind

Analysis Notes

This program is designed to distribute an applied shear load to a set of resisting elements.

Each resisting element data entry specifies a deflection along a "major" and "minor" axis due to a 1,000 lb load. Each resisting element may be entered as a wall or a column (whereby the deflection is calculated), or as a generic resisting element with specified deflection. The deflections define the stiffness of each resisting element.

Each resisting element is defined at an (X,Y) location from a datum the user has previously defined. A counter-clockwise rotation of the element can be entered with respect to a traditional "+X" axis line.

A main "shear" load and an optional orthogonal shear load are specified for distribution to the system of resisting elements. In addition the maximum orthogonal dimensions of the structure and minimum accidental eccentricity percentage are specified.

From the entered loads the program calculates resultant force vectors for each angular orientation that is requested. The force is applied to the resisting elements in angular increments to generate a series of resulting direct and torsional shear loads on each element. This application of force is then repeated at angular intervals along an elliptical path defined by the minimum accidental eccentricity.

The end result is a table of direct shear and torsional shear values for each element from the iterated angles of load application and accidental eccentricity. These values are then searched to find the maximum major and minor axis shears applied to each resisting element.

Project Title:
Engineer:
Project ID:
Project Descr:

Masonry Shear Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: NORTH Y2

Code References

Calculations per TMS 402-16, IBC 2018, CBC 2019, SDPWS 2015
Load Combinations Used : IBC 2021

General Information

Wall Material	MASONRY	f'm	2.50 ksi	Block Class	
Total Wall Height	32.0 ft	Fy - Rebar	60.0 ksi	Concrete Density	150.0 pcf
Base Wall Length	11.0 ft	Fy - HJR	70.0 ksi	Min. Bending As %	0.00180
R: Resp. Mod Factor		Em	3,120.0 ksi		
Ie: Seismic Import. Factor	1.50	Phi - Shear	0.80	Phi : Axial & Flexure	0.90

Wall Data

	<u>Bottom</u>	<u>2nd Level</u>
Analysis Height	0.00 ft	15.330 ft
Wall Offset (datum)	ft	ft
Wall Length	11.0 ft	11.0 ft
Effective Length 'd'	116.0 in	112.0 ft
Nominal Block Thickness	8 in	8 in
Solid Grout?	Solid Grouted	Partial Groute

Reinforcing in Field of Wall

Vertical Bar Size #	5	5
Vertical Bar Spacing	8 in	8 in
Horiz. joint reinf. area (HJR)	.02 in	.02 in
HJR Spacing	16 in	16 in
Bond beam reinf. area	.4 in	0.4 in
Spacing of bond beams	48 in	48 in

In each chord cell:

Vertical rebar size #	10	6
# Chord Cells @ Each End	4.0	5.0

Masonry Shear Wall

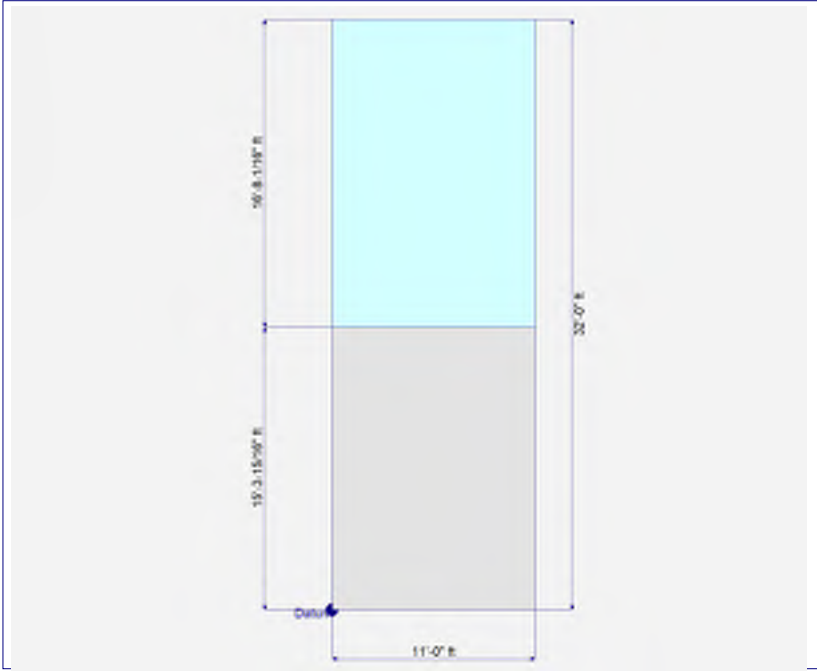
Project File: LS JOC 2.ec6
(c) ENERCALC, LLC 1982-2024

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

DESCRIPTION: NORTH Y2

Wall Sketch



SHEAR ANALYSIS

	Bottom Level	2nd Level
Special Boundary		
Elements Req'd?	Not Req'd	Not Req'd
Vu : Story Shear	94.10 k	51.90 k
for Load Combination 20D+0.50Lr+0.50Lr+0.50Lr+W		
Anv	1,003.20 in^2	1,003.20 in^2
Controlling Mu/(Vud)	1.00	1.00
Vn Masonry	130.419 k	126.068 k
Vn Steel	31.020 k	31.020 k
Vn Masonry + Vn Steel	161.439 k	157.088 k
Vn Max	200.640 k	200.640 k
Phi Vn	129.151 k	125.671 k
Ratio: Vu/PhiVn (controlling)	0.7286	0.4130
Vertical As >= Av/3	OK	OK
Vertical Bar Spacing <= 96"	OK	OK

AXIAL ANALYSIS

	Bottom Level	2nd Level
H / d Ratio	1.59	1.79
Pu	70.236 k	52.833 k
for Load Combination +1.20D+0.50Lr+1.60L		
Phi Pn	0.50Lr+1.60L k	0.50Lr+1.60L k
Ratio: Pu/PhiPn (controlling)	0.03814	0.02886

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Masonry Shear Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: NORTH Y2

BENDING ANALYSIS

	Bottom Level	2nd Level
"a" : Flexural compression	19.99 in	8.66 in
Length of defined chord zone is >= the "a" dimension of the masonry (the compression zone)	OK	OK
"d" : Eff depth to tension reinf	116.0	112.0
As-flex < As-max ?	180 <= 13.063	100 <= 12.613
Mu	2,324.85 k	882.30 k
for Load Combination	1.20D+0.50Lr+0.50L	1.20D+0.50Lr+0.50L+
Phi Mn	2,423.31 k	1,065.95 k
Ratio: Mu/PhiMn (controlling)	0.9594	0.8277

Force Summary

Load Combination Wall Level	Values for Wall section			Resultant Ecc (ft)	Overturning Ratio	Uplift (k)	
	Vu (k)	Mu (k)	Pu (k)			Left	Right
+1.40D							
Wall Level : 2			35.568				
Wall Level : 1			55.871				
+1.20D+0.50Lr+1.60L							
Wall Level : 2			52.833				
Wall Level : 1			70.236				
+1.20D+1.60L							
Wall Level : 2			52.487				
Wall Level : 1			69.890				
+1.20D+1.60Lr+0.50L							
Wall Level : 2			38.471				
Wall Level : 1			55.873				
+1.20D+1.60Lr+0.50W							
Wall Level : 2	25.950	441.150	31.596	13.962	0.394	28.647	28.647
Wall Level : 1	47.050	1,162.427	48.998	23.724	0.232	95.672	95.672
+1.20D+0.50L							
Wall Level : 2			37.362				
Wall Level : 1			54.765				
+1.20D+0.50W							
Wall Level : 2	25.950	441.150	30.487	14.470	0.380	29.301	29.301
Wall Level : 1	47.050	1,162.427	47.890	24.273	0.227	96.325	96.325
+1.20D+0.50Lr+0.50L+W							
Wall Level : 2	51.900	882.300	37.708	23.398	0.235	72.311	72.311
Wall Level : 1	94.100	2,324.853	55.111	42.185	0.130	216.615	216.615
+1.20D+0.50L+W							
Wall Level : 2	51.900	882.300	37.362	23.615	0.233	72.515	72.515
Wall Level : 1	94.100	2,324.853	54.765	42.452	0.130	216.819	216.819
+1.20D+0.50L+E							
Wall Level : 2			37.362				
Wall Level : 1			54.765				
+0.90D+W							
Wall Level : 2	51.900	882.300	22.865	38.587	0.143	81.058	81.058
Wall Level : 1	94.100	2,324.853	35.917	64.728	0.085	227.926	227.926
+0.90D+E							
Wall Level : 2			22.865				
Wall Level : 1			35.917				

Project Title:
Engineer:
Project ID:
Project Descr:

Masonry Shear Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: NORTH Y2

Footing Information

Footing Dimensions

Dist. Left	1.0 ft	f'c	3.0 ksi	Rebar Cover	3.0 in
Wall Length	11.0 ft	Fy	60.0 ksi	Footing Thickness	12.0 in
Dist. Right	1.0 ft			Width	2.0 ft
Total Ftg Length	13.0 ft				

Max Factored Soil Pressures

@ Left Side of Footing	2,883.05 psf
.... governing load comb +1.20D+0.50Lr+1.60L	
@ Right Side of Footing	2,883.05 psf
.... governing load comb +1.20D+0.50Lr+1.60L	

Max UNfactored Soil Pressures

@ Left Side of Footing	2,215.15 psf
.... governing load comb +1.0D+L	
@ Right Side of Footing	2,215.15 psf
.... governing load comb +1.0D+L	

Footing One-Way Shear Check...

vu @ Left End of Footing	7.851 psi
Phi * vn : Allowable	82.158 psi
vu / Phi * vn	0.10
vu @ Right End of Footing	7.851 psi
Phi * vn : Allowable	82.16 psi
vu / Phi * vn	0.10

Overturning Stability... @ Left End of Ftg

Overturning Moment	1,451.37 k-ft
Resisting Moment	106.307 k-ft
Stability Ratio	0.07325 : 1
.... governing load comb	+0.60D+0.60W

@ Right End of Ftg

Overturning Moment	1,451.37 k-ft
Resisting Moment	106.307 k-ft
Stability Ratio	0.07325 : 1
.... governing load comb	+0.60D+0.60W

Footing Bending Design... @ Left End

Mu	2.883 k-ft
Ru	19.774 psi
As % Req'd	0.00180 in^2
As Req'd in Footing Width	0.5184 in^2

@ Right End

Mu	2.883 k-ft
Ru	19.774 psi
As % Req'd	0.00180 in^2
As Req'd in Footing Width	0.5184 in^2

Project Title:
Engineer:
Project ID:
Project Descr:

Masonry Shear Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: NORTH X3

Code References

Calculations per TMS 402-16, IBC 2018, CBC 2019, SDPWS 2015
Load Combinations Used : IBC 2021

General Information

Wall Material	MASONRY	f'm	2.50 ksi	Block Class	
Total Wall Height	32.0 ft	Fy - Rebar	60.0 ksi	Concrete Density	150.0 pcf
Base Wall Length	8.670 ft	Fy - HJR	70.0 ksi	Min. Bending As %	0.00180
R: Resp. Mod Factor		Em	3,120.0 ksi		
Ie: Seismic Import. Factor	1.50	Phi - Shear	0.80	Phi : Axial & Flexure	0.90

Wall Data

	<u>Bottom</u>	<u>2nd Level</u>
Analysis Height	0.00 ft	15.330 ft
Wall Offset	(datum) ft	ft
Wall Length	8.670 ft	8.670 ft
Effective Length 'd'	88.040 in	88.040 ft
Nominal Block Thickness	8 in	8 in
Solid Grout?	Solid Grouted	Partial Groute

Reinforcing in Field of Wall

Vertical Bar Size #	5	5
Vertical Bar Spacing	8 in	8 in
Horiz. joint reinf. area (HJR)	.02 in	.02 in
HJR Spacing	16 in	16 in
Bond beam reinf. area	.4 in	0.4 in
Spacing of bond beams	48 in	48 in

In each chord cell:

Vertical rebar size #	10	6
# Chord Cells @ Each End	4.0	4.0

Masonry Shear Wall

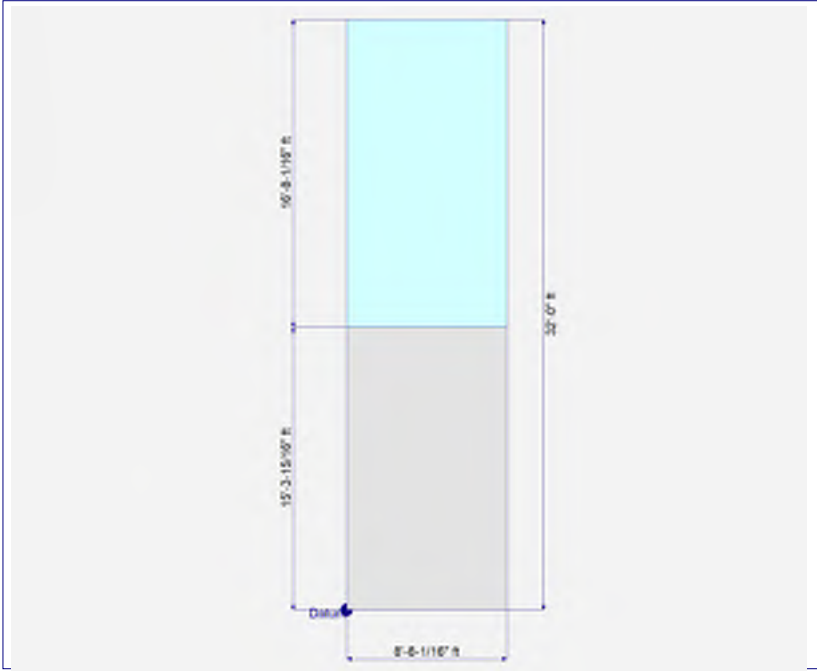
Project File: LS JOC 2.ec6
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LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

DESCRIPTION: NORTH X3

Wall Sketch



SHEAR ANALYSIS

	Bottom Level	2nd Level
Special Boundary		
Elements Req'd?	Not Req'd	Not Req'd
Vu : Story Shear	70.40 k	28.50 k
for Load Combination	20D+0.50Lr+0.50Lr+W	20D+0.50Lr+0.50L+W
Anv	790.70 in^2	790.70 in^2
Controlling Mu/(Vud)	1.00	1.00
Vn Masonry	98.740 k	95.273 k
Vn Steel	24.449 k	24.449 k
Vn Masonry + Vn Steel	123.189 k	119.723 k
Vn Max	158.141 k	158.141 k
Phi Vn	98.552 k	95.778 k
Ratio: Vu/PhiVn (controlling)	0.7143	0.2976
Vertical As >= Av/3	OK	OK
Vertical Bar Spacing <= 96"	OK	OK

AXIAL ANALYSIS

	Bottom Level	2nd Level
H / d Ratio	2.09	2.27
Pu	39.143 k	25.277 k
for Load Combination	+1.40D+1.60Lr+0.50L	+1.40D+1.60Lr+0.50L
Phi Pn	+1.40D k	1.60Lr+0.50L k
Ratio: Pu/PhiPn (controlling)	0.02697	0.01752

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Masonry Shear Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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DESCRIPTION: NORTH X3

BENDING ANALYSIS

	<u>Bottom Level</u>	<u>2nd Level</u>
"a" : Flexural compression	19.99 in	6.92 in
Length of defined chord zone is >= the "a" dimension of the masonry (the compression zone)	OK	OK
"d" : Eff depth to tension reinf	88.040	88.040
As-flex < As-max ?	080 <= 9.915	760 <= 9.915
Mu	1,566.95 k	487.719 k
for Load Combination 1.20D+0.50Lr+0.50L	1,566.95 k	487.719 k
Phi Mn	1,784.14 k	669.86 k
Ratio: Mu/PhiMn (controlling)	0.8783	0.7281

Force Summary

Load Combination Wall Level	Values for Wall section			Resultant Ecc (ft)	Overturning Ratio	Uplift (k)	
	Vu (k)	Mu (k)	Pu (k)			Left	Right
+1.40D							
Wall Level : 2		2.261	23.141	0.098			
Wall Level : 1		2.261	39.143	0.058			
+1.20D+0.50Lr+1.60L							
Wall Level : 2		6.038	24.712	0.244			
Wall Level : 1		6.038	38.428	0.157			
+1.20D+1.60L							
Wall Level : 2		6.038	23.355	0.259			
Wall Level : 1		6.038	37.071	0.163			
+1.20D+1.60Lr+0.50L							
Wall Level : 2		3.219	25.277	0.127			
Wall Level : 1		3.219	38.993	0.083			
+1.20D+1.60Lr+0.50W							
Wall Level : 2	14.250	244.188	24.177	10.100	0.425	18.998	18.998
Wall Level : 1	35.200	783.804	37.893	20.684	0.208	84.444	84.444
+1.20D+0.50L							
Wall Level : 2		3.219	20.935	0.154			
Wall Level : 1		3.219	34.651	0.093			
+1.20D+0.50W							
Wall Level : 2	14.250	244.188	19.835	12.311	0.347	21.563	21.563
Wall Level : 1	35.200	783.804	33.551	23.361	0.184	87.009	87.009
+1.20D+0.50Lr+0.50L+W							
Wall Level : 2	28.500	487.719	22.292	21.879	0.193	53.305	53.305
Wall Level : 1	70.400	1,566.951	36.008	43.516	0.098	192.302	192.302
+1.20D+0.50L+W							
Wall Level : 2	28.500	487.719	20.935	23.297	0.181	54.107	54.107
Wall Level : 1	70.400	1,566.951	34.651	45.220	0.094	193.104	193.104
+1.20D+0.50L+E							
Wall Level : 2		3.219	20.935	0.154			
Wall Level : 1		3.219	34.651	0.093			
+0.90D+W							
Wall Level : 2	28.500	485.953	14.876	32.666	0.130	57.446	57.446
Wall Level : 1	70.400	1,565.185	25.164	62.200	0.069	198.469	198.469
+0.90D+E							
Wall Level : 2		1.453	14.876	0.098			
Wall Level : 1		1.453	25.164	0.058			

Project Title:
Engineer:
Project ID:
Project Descr:

Masonry Shear Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: NORTH X3

Footing Information

Footing Dimensions

Dist. Left	1.0 ft	f'c	3.0 ksi	Rebar Cover	3.0 in
Wall Length	8.670 ft	Fy	60.0 ksi	Footing Thickness	12.0 in
Dist. Right	1.0 ft			Width	2.0 ft
Total Ftg Length	10.670 ft				

Max Factored Soil Pressures

@ Left Side of Footing	1,986.36 psf
.... governing load comb	+1.40D
@ Right Side of Footing	2,141.30 psf
.... governing load comb	+1.20D+0.50Lr+1.60L

Max UNfactored Soil Pressures

@ Left Side of Footing	1,545.99 psf
.... governing load comb	+1.0D+Lr
@ Right Side of Footing	1,727.27 psf
.... governing load comb	+1.0D+0.750Lr+0.750L

Footing One-Way Shear Check...

vu @ Left End of Footing	5.413 psi
Phi * vn : Allowable	82.158 psi
vu / Phi * vn	0.07
vu @ Right End of Footing	5.821 psi
Phi * vn : Allowable	82.16 psi
vu / Phi * vn	0.07

Overturning Stability... @ Left End of Ftg

Overturning Moment	980.48 k-ft
Resisting Moment	58.878 k-ft
Stability Ratio	0.06005 : 1
.... governing load comb	+0.60D+0.60W

@ Right End of Ftg

Overturning Moment	980.48 k-ft
Resisting Moment	56.940 k-ft
Stability Ratio	0.05807 : 1
.... governing load comb	+0.60D+0.60W

Footing Bending Design... @ Left End

Mu	1.990 k-ft
Ru	13.649 psi
As % Req'd	0.00180 in^2
As Req'd in Footing Width	0.5184 in^2

@ Right End

Mu	2.131 k-ft
Ru	14.618 psi
As % Req'd	0.00180 in^2
As Req'd in Footing Width	0.5184 in^2

Project Title:
Engineer:
Project ID:
Project Descr:

Masonry Shear Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: NORTH Y1

Code References

Calculations per TMS 402-16, IBC 2018, CBC 2019, SDPWS 2015
Load Combinations Used : IBC 2021

General Information

Wall Material	MASONRY	f'm	2.50 ksi	Block Class	
Total Wall Height	15.330 ft	Fy - Rebar	60.0 ksi	Concrete Density	150.0 pcf
Base Wall Length	9.330 ft	Fy - HJR	70.0 ksi	Min. Bending As %	0.00180
R: Resp. Mod Factor		Em	3,120.0 ksi		
Ie: Seismic Import. Factor	1.50	Phi - Shear	0.80	Phi : Axial & Flexure	0.90

Wall Data

Bottom

Analysis Height	0.00 ft
Wall Offset	(datum) ft
Wall Length	9.330 ft
Effective Length 'd'	103.960 in
Nominal Block Thickness	8 in
Solid Grout?	Solid Grouted

Reinforcing in Field of Wall

Vertical Bar Size #	5
Vertical Bar Spacing	8 in
Horiz. joint reinf. area (HJR)	.02 in
HJR Spacing	16 in
Bond beam reinf. area	.4 in
Spacing of bond beams	48 in

In each chord cell:

Vertical rebar size #	10
# Chord Cells @ Each End	2.0

Masonry Shear Wall

Project File: LS JOC 2.ec6

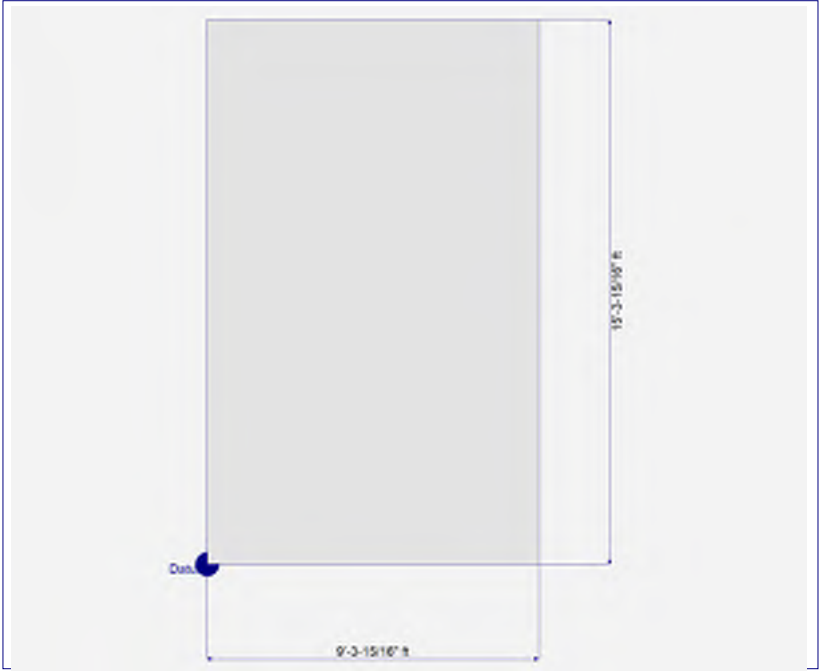
LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: NORTH Y1

Wall Sketch



Shear Analysis

Bottom Level

Special Boundary	
Elements Req'd?	Not Req'd
Vu : Story Shear	22.80 k
for Load Combination	+1.20D+0.50L+W
Anv	850.90 in^2
Controlling Mu/(Vud)	1.00
Vn Masonry	107.599 k
Vn Steel	26.311 k
Vn Masonry + Vn Steel	133.909 k
Vn Max	170.179 k
Phi Vn	107.128 k
Ratio: Vu/PhiVn (controlling)	0.2128
Vertical As >= Av/3	OK
Vertical Bar Spacing <= 96"	OK

AXIAL ANALYSIS

Bottom Level

H / d Ratio	1.77
Pu	47.492 k
for Load Combination	+1.20D+1.60L
Phi Pn	-1.20D+1.60L k
Ratio: Pu/PhiPn (controlling)	0.03041

Masonry Shear Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: NORTH Y1

BENDING ANALYSIS

Bottom Level

"a" : Flexural compression	9.99 in
Length of defined chord zone is >= the "a" dimension of the masonry (the compression zone)	OK
"d" : Eff depth to tension reinf	103.960
As-flex < As-max ?	140 <= 11.707
Mu	364.226 k
for Load Combination	+1.20D+0.50L+W
Phi Mn	1,131.15 k
Ratio: Mu/PhiMn (controlling)	0.3220

Force Summary

Load Combination Wall Level	Values for Wall section			Resultant Ecc (ft)	Overturning Ratio	Uplift (k)	
	Vu (k)	Mu (k)	Pu (k)			Left	Right
+1.40D							
Wall Level : 1		10.454	29.741	0.352			
+1.20D+1.60L							
Wall Level : 1		27.331	47.492	0.575			
+1.20D+0.50L							
Wall Level : 1		14.702	32.367	0.454			
+1.20D+0.50W							
Wall Level : 1	11.400	183.723	25.492	7.207	0.629	7.480	7.480
+1.20D+0.50L+W							
Wall Level : 1	22.800	364.226	32.367	11.253	0.390	24.613	24.613
+1.20D+0.50L+E							
Wall Level : 1		14.702	32.367	0.454			
+0.90D+W							
Wall Level : 1	22.800	356.245	19.119	18.633	0.236	30.826	30.826
+0.90D+E							
Wall Level : 1		6.721	19.119	0.352			

Project Title:
Engineer:
Project ID:
Project Descr:

Masonry Shear Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: NORTH Y1

Footing Information

Footing Dimensions

Dist. Left	1.0 ft	f'c	3.0 ksi	Rebar Cover	3.0 in
Wall Length	9.330 ft	Fy	60.0 ksi	Footing Thickness	12.0 in
Dist. Right	1.0 ft			Width	2.0 ft
Total Ftg Length	11.330 ft				

Max Factored Soil Pressures

@ Left Side of Footing	1,638.15 psf
.... governing load comb	+1.20D+1.60L
@ Right Side of Footing	2,915.60 psf
.... governing load comb	+1.20D+1.60L

Max UNfactored Soil Pressures

@ Left Side of Footing	1,252.30 psf
.... governing load comb	1.0D+L
@ Right Side of Footing	28,111.2 psf
.... governing load comb	1.0D+0.750L+0.450W

Footing One-Way Shear Check...

vu @ Left End of Footing	4.50 psi
Phi * vn : Allowable	82.158 psi
vu / Phi * vn	0.05
vu @ Right End of Footing	7.902 psi
Phi * vn : Allowable	82.16 psi
vu / Phi * vn	0.10

Overturning Stability... @ Left End of Ftg

Overturning Moment	223.394 k-ft	223.394 k-ft
Resisting Moment	85.930 k-ft	76.969 k-ft
Stability Ratio	0.3847 : 1	0.3445 : 1
.... governing load comb	+0.60D+0.60W	+0.60D+0.60W

@ Right End of Ftg

Footing Bending Design...

@ Left End

Mu	1.676 k-ft
Ru	11.493 psi
As % Req'd	0.00180 in^2
As Req'd in Footing Width	0.5184 in^2

@ Right End

Mu	2.878 k-ft
Ru	19.739 psi
As % Req'd	0.00180 in^2
As Req'd in Footing Width	0.5184 in^2

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Combined Footing

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

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DESCRIPTION: Grid F

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, SDPWS 2015
 Load Combinations Used : IBC 2021

General Information

Material Properties

f'c : Concrete 28 day strength	3.0 ksi
fy : Rebar Yield	60.0 ksi
Ec : Concrete Elastic Modulus	3,122.0 ksi
Concrete Density	145.0 pcf
φ : Phi Values	
Flexure :	0.90
Shear :	0.750

Analysis/Design Settings

Calculate footing weight as dead load ?	No
Calculate Pedestal weight as dead load ?	No
Min Steel % Bending Reinf (based on 'd')	
Min Allow % Temp Reinf (based on thick)	0.00180
Min. Overturning Safety Factor	1.0: 1
Min. Sliding Safety Factor	1.0: 1

Soil Information

Allowable Soil Bearing	12.0 ksf
Increase Bearing By Footing Weight	No
Soil Passive Sliding Resistance	250.0 pcf
(Uses entry for "Footing base depth below soil surface" for force)	
Coefficient of Soil/Concrete Friction	0.30

Soil Bearing Increase

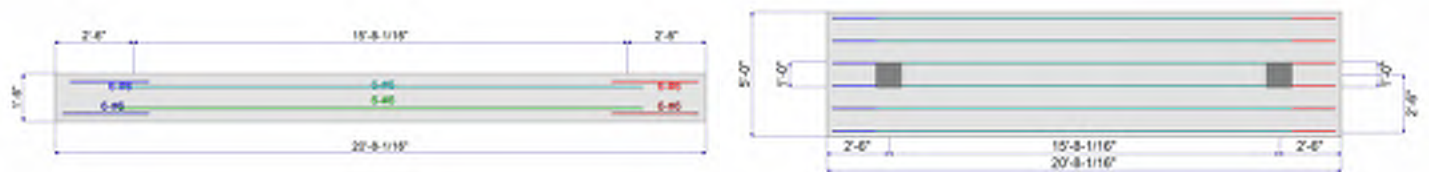
Footing base depth below soil surface	ft
Increases based on footing Depth	
Allowable pressure increase per foot	ksf
when base of footing is below	ft
Increases based on footing Width . . .	
Allowable pressure increase per foot	ksf
when maximum length or width is greater tha	ft
Maximum Allowed Bearing Pressure	10.0 ksf
(A value of zero implies no limit)	
Adjusted Allowable Soil Bearing	ksf
(Allowable Soil Bearing adjusted for footing weight and depth & width increases as specified by user.)	

Dimensions & Reinforcing

Distance Left of Column #1	=	2.50 ft	Pedestal dimensions...		Col #1	Col #2	Bars left of Col #1	Count	Size #	As	As
Between Columns	=	15.670 ft								Provided	Req'd
Distance Right of Column #2	=	2.50 ft	Sq. Dim.	=	12.0	12.0 in	Bottom Bars	6.0	6	2.640	1.944 in^2
Total Footing Length	=	ft					Top Bars	6.0	6	2.640	0.0 in^2
Footing Width	=	5.0 ft	Height	=			Bars Btwn Cols				
Footing Thickness	=	18.0 in					Bottom Bars	6.0	6	2.640	1.944 in^2
							Top Bars	6.0	6	2.640	2.558 in^2
							Bars Right of Col #2				
Rebar Center to Concrete Edge @ Top	=	3.0 in					Bottom Bars	6.0	6	2.640	1.944 in^2
Rebar Center to Concrete Edge @ Bottom	=	3.0 in					Top Bars	6.0	6	2.640	0.0 in^2

Applied Loads

Applied @ Left Column	D	Lr	L	S	W	E	H
Axial Load Downward	=	25.0	15.40	3.90	16.010		k
Moment (+CW)	=						k-ft
Shear (+X)	=	3.30	3.90	0.550	4.70		k
Applied @ Right Column	D	Lr	L	S	W	E	H
Axial Load Downward	=	25.0	3.920	3.850	-0.0970		k
Moment (+CW)	=						k-ft
Shear (+X)	=	1.90	-0.550	1.320	2.620		k
Overburden	=						



Project Title:
Engineer:
Project ID:
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Combined Footing

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LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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DESCRIPTION: Grid F

DESIGN SUMMARY

Design OK

Factor of Safety	Item	Applied	Capacity	Governing Load Combination	
PASS	34.798	Overturing	14.850 k-ft	516.75 k-ft	+D+S
PASS	1.515	Sliding	9.90 k	15.0 k	+D+S
PASS	680.52	Uplift	0.05820 k	39.606 k	+0.60D+0.60W

Utilization Ratio	Item	Applied	Capacity	Governing Load Combination	
PASS	0.106	Soil Bearing	1.055 ksf	10.0 ksf	+D+0.750Lr+0.750L+0.450W
PASS	0.453	1-way Shear - Col #1	37.2 psi	82.2 psi	+1.20D+1.60Lr+0.50W
PASS	0.336	1-way Shear - Col #2	27.6 psi	82.2 psi	+1.20D+1.60Lr+0.50W
PASS	0.210	2-way Punching - Col #1	34.5 psi	164.3 psi	+1.20D+1.60Lr+0.50W
PASS	0.225	2-way Punching - Col #2	34.5 psi	164.3 psi	+1.20D+1.60Lr+0.50W
PASS	No Bending	Flexure - Left of Col #1 - Top	0.0 k-ft	0.0 k-ft	N/A
PASS	0.081	Flexure - Left of Col #1 - Bottom	13.981 k-ft	172.050 k-ft	+1.20D+1.60Lr+0.50W
PASS	0.734	Flexure - Between Cols - Top	-126.265 k-ft	172.050 k-ft	+1.20D+1.60Lr+0.50W
PASS	0.082	Flexure - Between Cols - Bottom	14.193 k-ft	172.050 k-ft	+1.20D+1.60Lr+0.50W
PASS	No Bending	Flexure - Right of Col #2 - Top	0.0 k-ft	0.0 k-ft	N/A
PASS	0.042	Flexure - Right of Col #2 - Bottom	7.178 k-ft	172.050 k-ft	+1.20D+1.60L+0.50S

Soil Bearing

Load Combination...	Total Bearing	Eccentricity from Ftg CL	Actual Soil Bearing Stress		Allowable	Actual / Allow Ratio
			@ Left Edge	@ Right Edge		
D Only	50.00 k	0.156 ft	0.46 ksf	0.51 ksf	10.00 ksf	0.051
+D+L	57.75 k	0.177 ft	0.53 ksf	0.59 ksf	10.00 ksf	0.059
+D+Lr	69.32 k	-1.113 ft	0.89 ksf	0.45 ksf	10.00 ksf	0.089
+D+S	50.00 k	0.297 ft	0.44 ksf	0.53 ksf	10.00 ksf	0.053
+D+0.750Lr+0.750L	70.30 k	-0.769 ft	0.83 ksf	0.53 ksf	10.00 ksf	0.083
+D+0.750L+0.750S	55.81 k	0.267 ft	0.50 ksf	0.58 ksf	10.00 ksf	0.058
+D+0.60W	59.55 k	-1.101 ft	0.76 ksf	0.39 ksf	10.00 ksf	0.076
+D+0.750Lr+0.750L+0.450W	77.46 k	-1.408 ft	1.06 ksf	0.44 ksf	10.00 ksf	0.106
+D+0.750L+0.750S+0.450W	62.97 k	-0.637 ft	0.72 ksf	0.50 ksf	10.00 ksf	0.072
+0.60D+0.60W	39.55 k	-1.737 ft	0.58 ksf	0.19 ksf	10.00 ksf	0.058
+0.60D	30.00 k	0.156 ft	0.28 ksf	0.30 ksf	10.00 ksf	0.030

Overturing Stability

Load Combination...	Moments about Left Edge k-ft			Moments about Right Edge k-ft		
	Overturing	Resisting	Ratio	Overturing	Resisting	Ratio
D Only	0.00	0.00	999.000	7.80	516.75	66.250
+D+L	0.00	0.00	999.000	10.61	597.24	56.317
+D+Lr	0.83	640.13	775.911	13.65	807.19	59.135
+D+S	0.00	0.00	999.000	14.85	516.75	34.798
+D+0.750Lr+0.750L	0.62	673.11	999.000	14.29	794.95	55.625
+D+0.750L+0.750S	0.00	0.00	999.000	15.19	577.12	37.990
+D+0.60W	1.06	550.92	520.970	10.30	691.29	67.093
+D+0.750Lr+0.750L+0.450W	1.41	692.89	490.763	16.17	925.85	57.261
+D+0.750L+0.750S+0.450W	0.79	611.50	771.004	17.07	708.02	41.480
+0.60D+0.60W	1.06	341.10	322.558	7.18	484.59	67.459
+0.60D	0.00	0.00	999.000	4.68	310.05	66.250

Sliding Stability

Load Combination...	Sliding Force	Resisting Force	Sliding SafetyRatio
D Only	5.20 k	15.00 k	2.885
+D+L	7.07 k	17.33 k	2.451
+D+Lr	8.55 k	20.80 k	2.432
+D+S	9.90 k	15.00 k	1.515
+D+0.750Lr+0.750L	9.12 k	21.09 k	2.314
+D+0.750L+0.750S	10.13 k	16.74 k	1.653
+D+0.60W	6.77 k	17.86 k	2.638
+D+0.750Lr+0.750L+0.450W	10.29 k	23.24 k	2.258
+D+0.750L+0.750S+0.450W	11.31 k	18.89 k	1.671
+0.60D+0.60W	4.69 k	11.86 k	2.529

Project Title:
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Combined Footing

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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DESCRIPTION: Grid F

Sliding Stability

Load Combination...	Sliding Force			Resisting Force		Sliding SafetyRatio		
+0.60D	3.12 k			9.00 k		2.885		
Z-Axis Footing Flexure - Maximum Values for Load Combination								
Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+0.60D	0.000	0.000	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.052	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60Lr+0.50W	0.040	0.103	Bottom	1.944	Min Temp %	2.640	172.050	0.000
+1.20D+1.60Lr+0.50W	0.089	0.155	Bottom	1.944	Min Temp %	2.640	172.050	0.001
+1.20D+1.60Lr+0.50W	0.158	0.207	Bottom	1.944	Min Temp %	2.640	172.050	0.001
+1.20D+1.60Lr+0.50W	0.247	0.258	Bottom	1.944	Min Temp %	2.640	172.050	0.001
+1.20D+1.60Lr+0.50W	0.355	0.310	Bottom	1.944	Min Temp %	2.640	172.050	0.002
+1.20D+1.60Lr+0.50W	0.483	0.362	Bottom	1.944	Min Temp %	2.640	172.050	0.003
+1.20D+1.60Lr+0.50W	0.631	0.413	Bottom	1.944	Min Temp %	2.640	172.050	0.004
+1.20D+1.60Lr+0.50W	0.798	0.465	Bottom	1.944	Min Temp %	2.640	172.050	0.005
+1.20D+1.60Lr+0.50W	0.985	0.517	Bottom	1.944	Min Temp %	2.640	172.050	0.006
+1.20D+1.60Lr+0.50W	1.191	0.568	Bottom	1.944	Min Temp %	2.640	172.050	0.007
+1.20D+1.60Lr+0.50W	1.416	0.620	Bottom	1.944	Min Temp %	2.640	172.050	0.008
+1.20D+1.60Lr+0.50W	1.661	0.672	Bottom	1.944	Min Temp %	2.640	172.050	0.010
+1.20D+1.60Lr+0.50W	1.925	0.723	Bottom	1.944	Min Temp %	2.640	172.050	0.011
+1.20D+1.60Lr+0.50W	2.209	0.775	Bottom	1.944	Min Temp %	2.640	172.050	0.013
+1.20D+1.60Lr+0.50W	2.512	0.827	Bottom	1.944	Min Temp %	2.640	172.050	0.015
+1.20D+1.60Lr+0.50W	2.834	0.878	Bottom	1.944	Min Temp %	2.640	172.050	0.016
+1.20D+1.60Lr+0.50W	3.175	0.930	Bottom	1.944	Min Temp %	2.640	172.050	0.018
+1.20D+1.60Lr+0.50W	3.535	0.982	Bottom	1.944	Min Temp %	2.640	172.050	0.021
+1.20D+1.60Lr+0.50W	3.915	1.034	Bottom	1.944	Min Temp %	2.640	172.050	0.023
+1.20D+1.60Lr+0.50W	4.314	1.085	Bottom	1.944	Min Temp %	2.640	172.050	0.025
+1.20D+1.60Lr+0.50W	4.731	1.137	Bottom	1.944	Min Temp %	2.640	172.050	0.028
+1.20D+1.60Lr+0.50W	5.168	1.189	Bottom	1.944	Min Temp %	2.640	172.050	0.030
+1.20D+1.60Lr+0.50W	5.624	1.240	Bottom	1.944	Min Temp %	2.640	172.050	0.033
+1.20D+1.60Lr+0.50W	6.099	1.292	Bottom	1.944	Min Temp %	2.640	172.050	0.035
+1.20D+1.60Lr+0.50W	6.592	1.344	Bottom	1.944	Min Temp %	2.640	172.050	0.038
+1.20D+1.60Lr+0.50W	7.105	1.395	Bottom	1.944	Min Temp %	2.640	172.050	0.041
+1.20D+1.60Lr+0.50W	7.637	1.447	Bottom	1.944	Min Temp %	2.640	172.050	0.044
+1.20D+1.60Lr+0.50W	8.187	1.499	Bottom	1.944	Min Temp %	2.640	172.050	0.048
+1.20D+1.60Lr+0.50W	8.756	1.550	Bottom	1.944	Min Temp %	2.640	172.050	0.051
+1.20D+1.60Lr+0.50W	9.344	1.602	Bottom	1.944	Min Temp %	2.640	172.050	0.054
+1.20D+1.60Lr+0.50W	9.950	1.654	Bottom	1.944	Min Temp %	2.640	172.050	0.058
+1.20D+1.60Lr+0.50W	10.575	1.705	Bottom	1.944	Min Temp %	2.640	172.050	0.061
+1.20D+1.60Lr+0.50W	11.219	1.757	Bottom	1.944	Min Temp %	2.640	172.050	0.065
+1.20D+1.60Lr+0.50W	11.882	1.809	Bottom	1.944	Min Temp %	2.640	172.050	0.069
+1.20D+1.60Lr+0.50W	12.563	1.860	Bottom	1.944	Min Temp %	2.640	172.050	0.073
+1.20D+1.60Lr+0.50W	13.262	1.912	Bottom	1.944	Min Temp %	2.640	172.050	0.077
+1.20D+1.60Lr+0.50W	13.981	1.964	Bottom	1.944	Min Temp %	2.640	172.050	0.081
+1.20D+1.60Lr+0.50W	14.710	2.015	Bottom	1.944	Min Temp %	2.640	172.050	0.085
+1.20D+1.60Lr+0.50W	15.332	2.067	Bottom	1.944	Min Temp %	2.640	172.050	0.089
+1.20D+1.60Lr+0.50W	15.804	2.119	Bottom	1.944	Min Temp %	2.640	172.050	0.092
+1.20D+1.60Lr+0.50W	16.128	2.170	Bottom	1.944	Min Temp %	2.640	172.050	0.094
+1.20D+1.60Lr+0.50W	16.303	2.222	Bottom	1.944	Min Temp %	2.640	172.050	0.095
+1.20D+1.60Lr+0.50W	16.330	2.274	Bottom	1.944	Min Temp %	2.640	172.050	0.095
+1.20D+1.60Lr+0.50W	16.207	2.325	Bottom	1.944	Min Temp %	2.640	172.050	0.094
+1.20D+1.60Lr+0.50W	15.935	2.377	Bottom	1.944	Min Temp %	2.640	172.050	0.093
+1.20D+1.60Lr+0.50W	15.513	2.429	Bottom	1.944	Min Temp %	2.640	172.050	0.090
+1.20D+1.60Lr+0.50W	14.943	2.480	Bottom	1.944	Min Temp %	2.640	172.050	0.087
+1.20D+1.60Lr+0.50W	29.524	2.532	Bottom	1.944	Min Temp %	2.640	172.050	0.172
+1.20D+1.60Lr+0.50W	28.655	2.584	Bottom	1.944	Min Temp %	2.640	172.050	0.167
+1.20D+1.60Lr+0.50W	27.637	2.635	Bottom	1.944	Min Temp %	2.640	172.050	0.161
+1.20D+1.60Lr+0.50W	26.470	2.687	Bottom	1.944	Min Temp %	2.640	172.050	0.154
+1.20D+1.60Lr+0.50W	25.154	2.739	Bottom	1.944	Min Temp %	2.640	172.050	0.146
+1.20D+1.60Lr+0.50W	23.688	2.790	Bottom	1.944	Min Temp %	2.640	172.050	0.138
+1.20D+1.60Lr+0.50W	22.073	2.842	Bottom	1.944	Min Temp %	2.640	172.050	0.128
+1.20D+1.60Lr+0.50W	20.308	2.894	Bottom	1.944	Min Temp %	2.640	172.050	0.118
+1.20D+1.60Lr+0.50W	18.394	2.945	Bottom	1.944	Min Temp %	2.640	172.050	0.107
+1.20D+1.60Lr+0.50W	16.331	2.997	Bottom	1.944	Min Temp %	2.640	172.050	0.095

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Combined Footing

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LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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DESCRIPTION: Grid F

Z-Axis Footing Flexure - Maximum Values for Load Combination

Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+1.20D+1.60Lr+0.50W	14.193	3.049	Bottom	1.944	Min Temp %	2.640	172.050	0.082
+1.20D+1.60S+0.50W	12.660	3.101	Bottom	1.944	Min Temp %	2.640	172.050	0.074
+1.20D+1.60S+0.50W	11.306	3.152	Bottom	1.944	Min Temp %	2.640	172.050	0.066
+1.20D+1.60S+0.50W	9.961	3.204	Bottom	1.944	Min Temp %	2.640	172.050	0.058
+1.20D+1.60S+0.50W	8.626	3.256	Bottom	1.944	Min Temp %	2.640	172.050	0.050
+1.20D+1.60S+0.50W	7.300	3.307	Bottom	1.944	Min Temp %	2.640	172.050	0.042
+1.20D+0.50L+1.60S	6.080	3.359	Bottom	1.944	Min Temp %	2.640	172.050	0.035
+1.40D	-6.037	3.411	Top	1.944	Min Temp %	2.640	172.050	0.035
+1.40D	-7.267	3.462	Top	1.944	Min Temp %	2.640	172.050	0.042
+1.20D+0.50Lr+0.50L+W	-8.589	3.514	Top	1.944	Min Temp %	2.640	172.050	0.050
+1.20D+0.50Lr+0.50L+W	-10.345	3.566	Top	1.944	Min Temp %	2.640	172.050	0.060
+1.20D+0.50Lr+0.50L+W	-12.086	3.617	Top	1.944	Min Temp %	2.640	172.050	0.070
+1.20D+0.50Lr+0.50L+W	-13.812	3.669	Top	1.944	Min Temp %	2.640	172.050	0.080
+1.20D+0.50Lr+0.50L+W	-15.523	3.721	Top	1.944	Min Temp %	2.640	172.050	0.090
+1.20D+0.50Lr+0.50L+W	-17.218	3.772	Top	1.944	Min Temp %	2.640	172.050	0.100
+1.20D+0.50Lr+0.50L+W	-18.898	3.824	Top	1.944	Min Temp %	2.640	172.050	0.110
+1.20D+0.50Lr+0.50L+W	-20.563	3.876	Top	1.944	Min Temp %	2.640	172.050	0.120
+1.20D+0.50Lr+0.50L+W	-22.213	3.927	Top	1.944	Min Temp %	2.640	172.050	0.129
+1.20D+0.50Lr+0.50L+W	-23.847	3.979	Top	1.944	Min Temp %	2.640	172.050	0.139
+1.20D+0.50Lr+0.50L+W	-25.467	4.031	Top	1.944	Min Temp %	2.640	172.050	0.148
+1.20D+0.50Lr+0.50L+W	-27.071	4.082	Top	1.944	Min Temp %	2.640	172.050	0.157
+1.20D+0.50Lr+0.50L+W	-28.660	4.134	Top	1.944	Min Temp %	2.640	172.050	0.167
+1.20D+0.50Lr+0.50L+W	-30.235	4.186	Top	1.944	Min Temp %	2.640	172.050	0.176
+1.20D+0.50Lr+0.50L+W	-31.794	4.237	Top	1.944	Min Temp %	2.640	172.050	0.185
+1.20D+0.50Lr+0.50L+W	-33.338	4.289	Top	1.944	Min Temp %	2.640	172.050	0.194
+1.20D+0.50Lr+0.50L+W	-34.868	4.341	Top	1.944	Min Temp %	2.640	172.050	0.203
+1.20D+0.50Lr+0.50L+W	-36.382	4.392	Top	1.944	Min Temp %	2.640	172.050	0.211
+1.20D+0.50Lr+0.50L+W	-37.882	4.444	Top	1.944	Min Temp %	2.640	172.050	0.220
+1.20D+0.50Lr+0.50L+W	-39.366	4.496	Top	1.944	Min Temp %	2.640	172.050	0.229
+1.20D+0.50Lr+0.50L+W	-40.836	4.547	Top	1.944	Min Temp %	2.640	172.050	0.237
+1.20D+0.50Lr+0.50L+W	-42.291	4.599	Top	1.944	Min Temp %	2.640	172.050	0.246
+1.20D+0.50Lr+0.50L+W	-43.732	4.651	Top	1.944	Min Temp %	2.640	172.050	0.254
+1.20D+0.50Lr+0.50L+W	-45.157	4.702	Top	1.944	Min Temp %	2.640	172.050	0.262
+1.20D+1.60Lr+0.50W	-46.641	4.754	Top	1.944	Min Temp %	2.640	172.050	0.271
+1.20D+1.60Lr+0.50W	-48.196	4.806	Top	1.944	Min Temp %	2.640	172.050	0.280
+1.20D+1.60Lr+0.50W	-49.735	4.857	Top	1.944	Min Temp %	2.640	172.050	0.289
+1.20D+1.60Lr+0.50W	-51.258	4.909	Top	1.944	Min Temp %	2.640	172.050	0.298
+1.20D+1.60Lr+0.50W	-52.763	4.961	Top	1.944	Min Temp %	2.640	172.050	0.307
+1.20D+1.60Lr+0.50W	-54.253	5.012	Top	1.944	Min Temp %	2.640	172.050	0.315
+1.20D+1.60Lr+0.50W	-55.726	5.064	Top	1.944	Min Temp %	2.640	172.050	0.324
+1.20D+1.60Lr+0.50W	-57.182	5.116	Top	1.944	Min Temp %	2.640	172.050	0.332
+1.20D+1.60Lr+0.50W	-58.623	5.168	Top	1.944	Min Temp %	2.640	172.050	0.341
+1.20D+1.60Lr+0.50W	-60.047	5.219	Top	1.944	Min Temp %	2.640	172.050	0.349
+1.20D+1.60Lr+0.50W	-61.455	5.271	Top	1.944	Min Temp %	2.640	172.050	0.357
+1.20D+1.60Lr+0.50W	-62.846	5.323	Top	1.944	Min Temp %	2.640	172.050	0.365
+1.20D+1.60Lr+0.50W	-64.221	5.374	Top	1.944	Min Temp %	2.640	172.050	0.373
+1.20D+1.60Lr+0.50W	-65.581	5.426	Top	1.944	Min Temp %	2.640	172.050	0.381
+1.20D+1.60Lr+0.50W	-66.924	5.478	Top	1.944	Min Temp %	2.640	172.050	0.389
+1.20D+1.60Lr+0.50W	-68.251	5.529	Top	1.944	Min Temp %	2.640	172.050	0.397
+1.20D+1.60Lr+0.50W	-69.562	5.581	Top	1.944	Min Temp %	2.640	172.050	0.404
+1.20D+1.60Lr+0.50W	-70.857	5.633	Top	1.944	Min Temp %	2.640	172.050	0.412
+1.20D+1.60Lr+0.50W	-72.136	5.684	Top	1.944	Min Temp %	2.640	172.050	0.419
+1.20D+1.60Lr+0.50W	-73.399	5.736	Top	1.944	Min Temp %	2.640	172.050	0.427
+1.20D+1.60Lr+0.50W	-74.646	5.788	Top	1.944	Min Temp %	2.640	172.050	0.434
+1.20D+1.60Lr+0.50W	-75.877	5.839	Top	1.944	Min Temp %	2.640	172.050	0.441
+1.20D+1.60Lr+0.50W	-77.093	5.891	Top	1.944	Min Temp %	2.640	172.050	0.448
+1.20D+1.60Lr+0.50W	-78.292	5.943	Top	1.944	Min Temp %	2.640	172.050	0.455
+1.20D+1.60Lr+0.50W	-79.476	5.994	Top	1.944	Min Temp %	2.640	172.050	0.462
+1.20D+1.60Lr+0.50W	-80.644	6.046	Top	1.944	Min Temp %	2.640	172.050	0.469
+1.20D+1.60Lr+0.50W	-81.797	6.098	Top	1.944	Min Temp %	2.640	172.050	0.475
+1.20D+1.60Lr+0.50W	-82.934	6.149	Top	1.944	Min Temp %	2.640	172.050	0.482
+1.20D+1.60Lr+0.50W	-84.055	6.201	Top	1.944	Min Temp %	2.640	172.050	0.489
+1.20D+1.60Lr+0.50W	-85.160	6.253	Top	1.944	Min Temp %	2.640	172.050	0.495

Project Title:
Engineer:
Project ID:
Project Descr:

Combined Footing

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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DESCRIPTION: Grid F

Z-Axis Footing Flexure - Maximum Values for Load Combination

Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+1.20D+1.60Lr+0.50W	-86.250	6.304	Top	1.944	Min Temp %	2.640	172.050	0.501
+1.20D+1.60Lr+0.50W	-87.325	6.356	Top	1.944	Min Temp %	2.640	172.050	0.508
+1.20D+1.60Lr+0.50W	-88.384	6.408	Top	1.944	Min Temp %	2.640	172.050	0.514
+1.20D+1.60Lr+0.50W	-89.428	6.459	Top	1.944	Min Temp %	2.640	172.050	0.520
+1.20D+1.60Lr+0.50W	-90.456	6.511	Top	1.944	Min Temp %	2.640	172.050	0.526
+1.20D+1.60Lr+0.50W	-91.469	6.563	Top	1.944	Min Temp %	2.640	172.050	0.532
+1.20D+1.60Lr+0.50W	-92.466	6.614	Top	1.944	Min Temp %	2.640	172.050	0.537
+1.20D+1.60Lr+0.50W	-93.448	6.666	Top	1.944	Min Temp %	2.640	172.050	0.543
+1.20D+1.60Lr+0.50W	-94.415	6.718	Top	1.944	Min Temp %	2.640	172.050	0.549
+1.20D+1.60Lr+0.50W	-95.367	6.769	Top	1.944	Min Temp %	2.640	172.050	0.554
+1.20D+1.60Lr+0.50W	-96.303	6.821	Top	1.944	Min Temp %	2.640	172.050	0.560
+1.20D+1.60Lr+0.50W	-97.224	6.873	Top	1.958	Min ACI 10.5	2.640	172.050	0.565
+1.20D+1.60Lr+0.50W	-98.131	6.924	Top	1.977	Min ACI 10.5	2.640	172.050	0.570
+1.20D+1.60Lr+0.50W	-99.022	6.976	Top	1.995	Min ACI 10.5	2.640	172.050	0.576
+1.20D+1.60Lr+0.50W	-99.898	7.028	Top	2.013	Min ACI 10.5	2.640	172.050	0.581
+1.20D+1.60Lr+0.50W	-100.759	7.079	Top	2.031	Min ACI 10.5	2.640	172.050	0.586
+1.20D+1.60Lr+0.50W	-101.605	7.131	Top	2.048	Min ACI 10.5	2.640	172.050	0.591
+1.20D+1.60Lr+0.50W	-102.436	7.183	Top	2.065	Min ACI 10.5	2.640	172.050	0.595
+1.20D+1.60Lr+0.50W	-103.252	7.234	Top	2.082	Min ACI 10.5	2.640	172.050	0.600
+1.20D+1.60Lr+0.50W	-104.053	7.286	Top	2.099	Min ACI 10.5	2.640	172.050	0.605
+1.20D+1.60Lr+0.50W	-104.839	7.338	Top	2.115	Min ACI 10.5	2.640	172.050	0.609
+1.20D+1.60Lr+0.50W	-105.611	7.390	Top	2.131	Min ACI 10.5	2.640	172.050	0.614
+1.20D+1.60Lr+0.50W	-106.368	7.441	Top	2.146	Min ACI 10.5	2.640	172.050	0.618
+1.20D+1.60Lr+0.50W	-107.110	7.493	Top	2.162	Min ACI 10.5	2.640	172.050	0.623
+1.20D+1.60Lr+0.50W	-107.837	7.545	Top	2.177	Min ACI 10.5	2.640	172.050	0.627
+1.20D+1.60Lr+0.50W	-108.550	7.596	Top	2.191	Min ACI 10.5	2.640	172.050	0.631
+1.20D+1.60Lr+0.50W	-109.248	7.648	Top	2.206	Min ACI 10.5	2.640	172.050	0.635
+1.20D+1.60Lr+0.50W	-109.931	7.700	Top	2.220	Min ACI 10.5	2.640	172.050	0.639
+1.20D+1.60Lr+0.50W	-110.600	7.751	Top	2.234	Min ACI 10.5	2.640	172.050	0.643
+1.20D+1.60Lr+0.50W	-111.255	7.803	Top	2.247	Min ACI 10.5	2.640	172.050	0.647
+1.20D+1.60Lr+0.50W	-111.894	7.855	Top	2.260	Min ACI 10.5	2.640	172.050	0.650
+1.20D+1.60Lr+0.50W	-112.520	7.906	Top	2.273	Min ACI 10.5	2.640	172.050	0.654
+1.20D+1.60Lr+0.50W	-113.131	7.958	Top	2.286	Min ACI 10.5	2.640	172.050	0.658
+1.20D+1.60Lr+0.50W	-113.727	8.010	Top	2.298	Min ACI 10.5	2.640	172.050	0.661
+1.20D+1.60Lr+0.50W	-114.310	8.061	Top	2.310	Min ACI 10.5	2.640	172.050	0.664
+1.20D+1.60Lr+0.50W	-114.877	8.113	Top	2.322	Min ACI 10.5	2.640	172.050	0.668
+1.20D+1.60Lr+0.50W	-115.431	8.165	Top	2.334	Min ACI 10.5	2.640	172.050	0.671
+1.20D+1.60Lr+0.50W	-115.970	8.216	Top	2.345	Min ACI 10.5	2.640	172.050	0.674
+1.20D+1.60Lr+0.50W	-116.496	8.268	Top	2.356	Min ACI 10.5	2.640	172.050	0.677
+1.20D+1.60Lr+0.50W	-117.006	8.320	Top	2.366	Min ACI 10.5	2.640	172.050	0.680
+1.20D+1.60Lr+0.50W	-117.503	8.371	Top	2.376	Min ACI 10.5	2.640	172.050	0.683
+1.20D+1.60Lr+0.50W	-117.986	8.423	Top	2.386	Min ACI 10.5	2.640	172.050	0.686
+1.20D+1.60Lr+0.50W	-118.455	8.475	Top	2.396	Min ACI 10.5	2.640	172.050	0.688
+1.20D+1.60Lr+0.50W	-118.909	8.526	Top	2.406	Min ACI 10.5	2.640	172.050	0.691
+1.20D+1.60Lr+0.50W	-119.350	8.578	Top	2.415	Min ACI 10.5	2.640	172.050	0.694
+1.20D+1.60Lr+0.50W	-119.776	8.630	Top	2.424	Min ACI 10.5	2.640	172.050	0.696
+1.20D+1.60Lr+0.50W	-120.189	8.681	Top	2.432	Min ACI 10.5	2.640	172.050	0.699
+1.20D+1.60Lr+0.50W	-120.588	8.733	Top	2.440	Min ACI 10.5	2.640	172.050	0.701
+1.20D+1.60Lr+0.50W	-120.973	8.785	Top	2.448	Min ACI 10.5	2.640	172.050	0.703
+1.20D+1.60Lr+0.50W	-121.344	8.836	Top	2.456	Min ACI 10.5	2.640	172.050	0.705
+1.20D+1.60Lr+0.50W	-121.701	8.888	Top	2.463	Min ACI 10.5	2.640	172.050	0.707
+1.20D+1.60Lr+0.50W	-122.045	8.940	Top	2.471	Min ACI 10.5	2.640	172.050	0.709
+1.20D+1.60Lr+0.50W	-122.374	8.991	Top	2.477	Min ACI 10.5	2.640	172.050	0.711
+1.20D+1.60Lr+0.50W	-122.691	9.043	Top	2.484	Min ACI 10.5	2.640	172.050	0.713
+1.20D+1.60Lr+0.50W	-122.993	9.095	Top	2.490	Min ACI 10.5	2.640	172.050	0.715
+1.20D+1.60Lr+0.50W	-123.282	9.146	Top	2.496	Min ACI 10.5	2.640	172.050	0.717
+1.20D+1.60Lr+0.50W	-123.557	9.198	Top	2.502	Min ACI 10.5	2.640	172.050	0.718
+1.20D+1.60Lr+0.50W	-123.819	9.250	Top	2.507	Min ACI 10.5	2.640	172.050	0.720
+1.20D+1.60Lr+0.50W	-124.067	9.301	Top	2.513	Min ACI 10.5	2.640	172.050	0.721
+1.20D+1.60Lr+0.50W	-124.302	9.353	Top	2.517	Min ACI 10.5	2.640	172.050	0.722
+1.20D+1.60Lr+0.50W	-124.523	9.405	Top	2.522	Min ACI 10.5	2.640	172.050	0.724
+1.20D+1.60Lr+0.50W	-124.731	9.457	Top	2.526	Min ACI 10.5	2.640	172.050	0.725
+1.20D+1.60Lr+0.50W	-124.926	9.508	Top	2.530	Min ACI 10.5	2.640	172.050	0.726

Project Title:
Engineer:
Project ID:
Project Descr:

Combined Footing

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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DESCRIPTION: Grid F

Z-Axis Footing Flexure - Maximum Values for Load Combination

Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+1.20D+1.60Lr+0.50W	-125.107	9.560	Top	2.534	Min ACI 10.5	2.640	172.050	0.727
+1.20D+1.60Lr+0.50W	-125.275	9.612	Top	2.538	Min ACI 10.5	2.640	172.050	0.728
+1.20D+1.60Lr+0.50W	-125.429	9.663	Top	2.541	Min ACI 10.5	2.640	172.050	0.729
+1.20D+1.60Lr+0.50W	-125.571	9.715	Top	2.544	Min ACI 10.5	2.640	172.050	0.730
+1.20D+1.60Lr+0.50W	-125.699	9.767	Top	2.547	Min ACI 10.5	2.640	172.050	0.731
+1.20D+1.60Lr+0.50W	-125.814	9.818	Top	2.549	Min ACI 10.5	2.640	172.050	0.731
+1.20D+1.60Lr+0.50W	-125.916	9.870	Top	2.551	Min ACI 10.5	2.640	172.050	0.732
+1.20D+1.60Lr+0.50W	-126.005	9.922	Top	2.553	Min ACI 10.5	2.640	172.050	0.732
+1.20D+1.60Lr+0.50W	-126.081	9.973	Top	2.554	Min ACI 10.5	2.640	172.050	0.733
+1.20D+1.60Lr+0.50W	-126.143	10.025	Top	2.556	Min ACI 10.5	2.640	172.050	0.733
+1.20D+1.60Lr+0.50W	-126.193	10.077	Top	2.557	Min ACI 10.5	2.640	172.050	0.733
+1.20D+1.60Lr+0.50W	-126.230	10.128	Top	2.558	Min ACI 10.5	2.640	172.050	0.734
+1.20D+1.60Lr+0.50W	-126.254	10.180	Top	2.558	Min ACI 10.5	2.640	172.050	0.734
+1.20D+1.60Lr+0.50W	-126.265	10.232	Top	2.558	Min ACI 10.5	2.640	172.050	0.734
+1.20D+1.60Lr+0.50W	-126.263	10.283	Top	2.558	Min ACI 10.5	2.640	172.050	0.734
+1.20D+1.60Lr+0.50W	-126.248	10.335	Top	2.558	Min ACI 10.5	2.640	172.050	0.734
+1.20D+1.60Lr+0.50W	-126.221	10.387	Top	2.557	Min ACI 10.5	2.640	172.050	0.734
+1.20D+1.60Lr+0.50W	-126.181	10.438	Top	2.557	Min ACI 10.5	2.640	172.050	0.733
+1.20D+1.60Lr+0.50W	-126.128	10.490	Top	2.555	Min ACI 10.5	2.640	172.050	0.733
+1.20D+1.60Lr+0.50W	-126.063	10.542	Top	2.554	Min ACI 10.5	2.640	172.050	0.733
+1.20D+1.60Lr+0.50W	-125.984	10.593	Top	2.552	Min ACI 10.5	2.640	172.050	0.732
+1.20D+1.60Lr+0.50W	-125.894	10.645	Top	2.551	Min ACI 10.5	2.640	172.050	0.732
+1.20D+1.60Lr+0.50W	-125.790	10.697	Top	2.548	Min ACI 10.5	2.640	172.050	0.731
+1.20D+1.60Lr+0.50W	-125.675	10.748	Top	2.546	Min ACI 10.5	2.640	172.050	0.730
+1.20D+1.60Lr+0.50W	-125.546	10.800	Top	2.543	Min ACI 10.5	2.640	172.050	0.730
+1.20D+1.60Lr+0.50W	-125.405	10.852	Top	2.540	Min ACI 10.5	2.640	172.050	0.729
+1.20D+1.60Lr+0.50W	-125.252	10.903	Top	2.537	Min ACI 10.5	2.640	172.050	0.728
+1.20D+1.60Lr+0.50W	-125.087	10.955	Top	2.534	Min ACI 10.5	2.640	172.050	0.727
+1.20D+1.60Lr+0.50W	-124.909	11.007	Top	2.530	Min ACI 10.5	2.640	172.050	0.726
+1.20D+1.60Lr+0.50W	-124.719	11.058	Top	2.526	Min ACI 10.5	2.640	172.050	0.725
+1.20D+1.60Lr+0.50W	-124.516	11.110	Top	2.522	Min ACI 10.5	2.640	172.050	0.724
+1.20D+1.60Lr+0.50W	-124.301	11.162	Top	2.517	Min ACI 10.5	2.640	172.050	0.722
+1.20D+1.60Lr+0.50W	-124.074	11.213	Top	2.513	Min ACI 10.5	2.640	172.050	0.721
+1.20D+1.60Lr+0.50W	-123.835	11.265	Top	2.508	Min ACI 10.5	2.640	172.050	0.720
+1.20D+1.60Lr+0.50W	-123.584	11.317	Top	2.503	Min ACI 10.5	2.640	172.050	0.718
+1.20D+1.60Lr+0.50W	-123.321	11.369	Top	2.497	Min ACI 10.5	2.640	172.050	0.717
+1.20D+1.60Lr+0.50W	-123.045	11.420	Top	2.491	Min ACI 10.5	2.640	172.050	0.715
+1.20D+1.60Lr+0.50W	-122.758	11.472	Top	2.485	Min ACI 10.5	2.640	172.050	0.713
+1.20D+1.60Lr+0.50W	-122.458	11.524	Top	2.479	Min ACI 10.5	2.640	172.050	0.712
+1.20D+1.60Lr+0.50W	-122.147	11.575	Top	2.473	Min ACI 10.5	2.640	172.050	0.710
+1.20D+1.60Lr+0.50W	-121.823	11.627	Top	2.466	Min ACI 10.5	2.640	172.050	0.708
+1.20D+1.60Lr+0.50W	-121.488	11.679	Top	2.459	Min ACI 10.5	2.640	172.050	0.706
+1.20D+1.60Lr+0.50W	-121.141	11.730	Top	2.452	Min ACI 10.5	2.640	172.050	0.704
+1.20D+1.60Lr+0.50W	-120.782	11.782	Top	2.444	Min ACI 10.5	2.640	172.050	0.702
+1.20D+1.60Lr+0.50W	-120.411	11.834	Top	2.437	Min ACI 10.5	2.640	172.050	0.700
+1.20D+1.60Lr+0.50W	-120.029	11.885	Top	2.429	Min ACI 10.5	2.640	172.050	0.698
+1.20D+1.60Lr+0.50W	-119.634	11.937	Top	2.421	Min ACI 10.5	2.640	172.050	0.695
+1.20D+1.60Lr+0.50W	-119.229	11.989	Top	2.412	Min ACI 10.5	2.640	172.050	0.693
+1.20D+1.60Lr+0.50W	-118.811	12.040	Top	2.404	Min ACI 10.5	2.640	172.050	0.691
+1.20D+1.60Lr+0.50W	-118.382	12.092	Top	2.395	Min ACI 10.5	2.640	172.050	0.688
+1.20D+1.60Lr+0.50W	-117.941	12.144	Top	2.385	Min ACI 10.5	2.640	172.050	0.686
+1.20D+1.60Lr+0.50W	-117.489	12.195	Top	2.376	Min ACI 10.5	2.640	172.050	0.683
+1.20D+1.60Lr+0.50W	-117.025	12.247	Top	2.367	Min ACI 10.5	2.640	172.050	0.680
+1.20D+1.60Lr+0.50W	-116.550	12.299	Top	2.357	Min ACI 10.5	2.640	172.050	0.677
+1.20D+1.60Lr+0.50W	-116.063	12.350	Top	2.347	Min ACI 10.5	2.640	172.050	0.675
+1.20D+1.60Lr+0.50W	-115.565	12.402	Top	2.336	Min ACI 10.5	2.640	172.050	0.672
+1.20D+1.60Lr+0.50W	-115.056	12.454	Top	2.326	Min ACI 10.5	2.640	172.050	0.669
+1.20D+1.60Lr+0.50W	-114.535	12.505	Top	2.315	Min ACI 10.5	2.640	172.050	0.666
+1.20D+1.60Lr+0.50W	-114.003	12.557	Top	2.304	Min ACI 10.5	2.640	172.050	0.663
+1.20D+1.60Lr+0.50W	-113.459	12.609	Top	2.293	Min ACI 10.5	2.640	172.050	0.659
+1.20D+1.60Lr+0.50W	-112.905	12.660	Top	2.281	Min ACI 10.5	2.640	172.050	0.656
+1.20D+1.60Lr+0.50W	-112.339	12.712	Top	2.270	Min ACI 10.5	2.640	172.050	0.653
+1.20D+1.60Lr+0.50W	-111.762	12.764	Top	2.258	Min ACI 10.5	2.640	172.050	0.650

Project Title:
Engineer:
Project ID:
Project Descr:

Combined Footing

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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DESCRIPTION: Grid F

Z-Axis Footing Flexure - Maximum Values for Load Combination

Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+1.20D+1.60Lr+0.50W	-111.174	12.815	Top	2.245	Min ACI 10.5	2.640	172.050	0.646
+1.20D+1.60Lr+0.50W	-110.575	12.867	Top	2.233	Min ACI 10.5	2.640	172.050	0.643
+1.20D+1.60Lr+0.50W	-109.965	12.919	Top	2.220	Min ACI 10.5	2.640	172.050	0.639
+1.20D+1.60Lr+0.50W	-109.344	12.970	Top	2.208	Min ACI 10.5	2.640	172.050	0.636
+1.20D+1.60Lr+0.50W	-108.712	13.022	Top	2.195	Min ACI 10.5	2.640	172.050	0.632
+1.20D+1.60Lr+0.50W	-108.069	13.074	Top	2.181	Min ACI 10.5	2.640	172.050	0.628
+1.20D+1.60Lr+0.50W	-107.415	13.125	Top	2.168	Min ACI 10.5	2.640	172.050	0.624
+1.20D+1.60Lr+0.50W	-106.750	13.177	Top	2.154	Min ACI 10.5	2.640	172.050	0.620
+1.20D+1.60Lr+0.50W	-106.074	13.229	Top	2.140	Min ACI 10.5	2.640	172.050	0.617
+1.20D+1.60Lr+0.50W	-105.388	13.280	Top	2.126	Min ACI 10.5	2.640	172.050	0.613
+1.20D+1.60Lr+0.50W	-104.690	13.332	Top	2.112	Min ACI 10.5	2.640	172.050	0.608
+1.20D+1.60Lr+0.50W	-103.982	13.384	Top	2.097	Min ACI 10.5	2.640	172.050	0.604
+1.20D+1.60Lr+0.50W	-103.264	13.436	Top	2.082	Min ACI 10.5	2.640	172.050	0.600
+1.20D+1.60Lr+0.50W	-102.534	13.487	Top	2.067	Min ACI 10.5	2.640	172.050	0.596
+1.20D+1.60Lr+0.50W	-101.794	13.539	Top	2.052	Min ACI 10.5	2.640	172.050	0.592
+1.20D+1.60Lr+0.50W	-101.044	13.591	Top	2.037	Min ACI 10.5	2.640	172.050	0.587
+1.20D+1.60Lr+0.50W	-100.283	13.642	Top	2.021	Min ACI 10.5	2.640	172.050	0.583
+1.20D+1.60Lr+0.50W	-99.511	13.694	Top	2.005	Min ACI 10.5	2.640	172.050	0.578
+1.20D+1.60Lr+0.50W	-98.729	13.746	Top	1.989	Min ACI 10.5	2.640	172.050	0.574
+1.20D+1.60Lr+0.50W	-97.936	13.797	Top	1.973	Min ACI 10.5	2.640	172.050	0.569
+1.20D+1.60Lr+0.50W	-97.133	13.849	Top	1.956	Min ACI 10.5	2.640	172.050	0.565
+1.20D+1.60Lr+0.50W	-96.320	13.901	Top	1.944	Min Temp %	2.640	172.050	0.560
+1.20D+1.60Lr+0.50W	-95.496	13.952	Top	1.944	Min Temp %	2.640	172.050	0.555
+1.20D+1.60Lr+0.50W	-94.662	14.004	Top	1.944	Min Temp %	2.640	172.050	0.550
+1.20D+1.60Lr+0.50W	-93.818	14.056	Top	1.944	Min Temp %	2.640	172.050	0.545
+1.20D+1.60Lr+0.50W	-92.963	14.107	Top	1.944	Min Temp %	2.640	172.050	0.540
+1.20D+1.60Lr+0.50W	-92.098	14.159	Top	1.944	Min Temp %	2.640	172.050	0.535
+1.20D+1.60Lr+0.50W	-91.223	14.211	Top	1.944	Min Temp %	2.640	172.050	0.530
+1.20D+1.60Lr+0.50W	-90.338	14.262	Top	1.944	Min Temp %	2.640	172.050	0.525
+1.20D+1.60Lr+0.50W	-89.443	14.314	Top	1.944	Min Temp %	2.640	172.050	0.520
+1.20D+1.60Lr+0.50W	-88.538	14.366	Top	1.944	Min Temp %	2.640	172.050	0.515
+1.20D+1.60Lr+0.50W	-87.623	14.417	Top	1.944	Min Temp %	2.640	172.050	0.509
+1.20D+1.60Lr+0.50W	-86.697	14.469	Top	1.944	Min Temp %	2.640	172.050	0.504
+1.20D+1.60Lr+0.50W	-85.762	14.521	Top	1.944	Min Temp %	2.640	172.050	0.498
+1.20D+1.60Lr+0.50W	-84.817	14.572	Top	1.944	Min Temp %	2.640	172.050	0.493
+1.20D+1.60Lr+0.50W	-83.862	14.624	Top	1.944	Min Temp %	2.640	172.050	0.487
+1.20D+1.60Lr+0.50W	-82.897	14.676	Top	1.944	Min Temp %	2.640	172.050	0.482
+1.20D+1.60Lr+0.50W	-81.923	14.727	Top	1.944	Min Temp %	2.640	172.050	0.476
+1.20D+1.60Lr+0.50W	-80.938	14.779	Top	1.944	Min Temp %	2.640	172.050	0.470
+1.20D+1.60Lr+0.50W	-79.944	14.831	Top	1.944	Min Temp %	2.640	172.050	0.465
+1.20D+1.60Lr+0.50W	-78.940	14.882	Top	1.944	Min Temp %	2.640	172.050	0.459
+1.20D+1.60Lr+0.50W	-77.926	14.934	Top	1.944	Min Temp %	2.640	172.050	0.453
+1.20D+1.60Lr+0.50W	-76.903	14.986	Top	1.944	Min Temp %	2.640	172.050	0.447
+1.20D+1.60Lr+0.50W	-75.870	15.037	Top	1.944	Min Temp %	2.640	172.050	0.441
+1.20D+1.60Lr+0.50W	-74.828	15.089	Top	1.944	Min Temp %	2.640	172.050	0.435
+1.20D+1.60Lr+0.50W	-73.776	15.141	Top	1.944	Min Temp %	2.640	172.050	0.429
+1.20D+1.60Lr+0.50W	-72.714	15.192	Top	1.944	Min Temp %	2.640	172.050	0.423
+1.20D+1.60Lr+0.50W	-71.644	15.244	Top	1.944	Min Temp %	2.640	172.050	0.416
+1.20D+1.60Lr+0.50W	-70.563	15.296	Top	1.944	Min Temp %	2.640	172.050	0.410
+1.20D+1.60Lr+0.50W	-69.473	15.347	Top	1.944	Min Temp %	2.640	172.050	0.404
+1.20D+1.60Lr+0.50W	-68.374	15.399	Top	1.944	Min Temp %	2.640	172.050	0.397
+1.20D+1.60Lr+0.50W	-67.266	15.451	Top	1.944	Min Temp %	2.640	172.050	0.391
+1.20D+1.60Lr+0.50W	-66.148	15.503	Top	1.944	Min Temp %	2.640	172.050	0.384
+1.20D+1.60Lr+0.50W	-65.021	15.554	Top	1.944	Min Temp %	2.640	172.050	0.378
+1.20D+1.60Lr+0.50W	-63.885	15.606	Top	1.944	Min Temp %	2.640	172.050	0.371
+1.20D+1.60Lr+0.50W	-62.740	15.658	Top	1.944	Min Temp %	2.640	172.050	0.365
+1.20D+1.60Lr+0.50W	-61.585	15.709	Top	1.944	Min Temp %	2.640	172.050	0.358
+1.20D+1.60Lr+0.50W	-60.422	15.761	Top	1.944	Min Temp %	2.640	172.050	0.351
+1.20D+1.60Lr+0.50W	-59.249	15.813	Top	1.944	Min Temp %	2.640	172.050	0.344
+1.20D+1.60Lr+0.50W	-58.067	15.864	Top	1.944	Min Temp %	2.640	172.050	0.338
+1.20D+1.60Lr+0.50W	-56.876	15.916	Top	1.944	Min Temp %	2.640	172.050	0.331
+1.20D+1.60Lr+0.50W	-55.677	15.968	Top	1.944	Min Temp %	2.640	172.050	0.324
+1.20D+1.60Lr+0.50W	-54.468	16.019	Top	1.944	Min Temp %	2.640	172.050	0.317

Project Title:
Engineer:
Project ID:
Project Descr:

Combined Footing

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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DESCRIPTION: Grid F

Z-Axis Footing Flexure - Maximum Values for Load Combination

Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+1.20D+1.60Lr+0.50W	-53.250	16.071	Top	1.944	Min Temp %	2.640	172.050	0.310
+1.20D+1.60Lr+0.50W	-52.024	16.123	Top	1.944	Min Temp %	2.640	172.050	0.302
+1.20D+1.60Lr+0.50W	-50.789	16.174	Top	1.944	Min Temp %	2.640	172.050	0.295
+1.20D+1.60Lr+0.50W	-49.545	16.226	Top	1.944	Min Temp %	2.640	172.050	0.288
+1.20D+1.60Lr+0.50W	-48.292	16.278	Top	1.944	Min Temp %	2.640	172.050	0.281
+1.20D+1.60Lr+0.50W	-47.030	16.329	Top	1.944	Min Temp %	2.640	172.050	0.273
+1.20D+1.60Lr+0.50W	-45.760	16.381	Top	1.944	Min Temp %	2.640	172.050	0.266
+1.20D+0.50Lr+0.50L+W	-44.559	16.433	Top	1.944	Min Temp %	2.640	172.050	0.259
+1.20D+0.50Lr+0.50L+W	-43.380	16.484	Top	1.944	Min Temp %	2.640	172.050	0.252
+1.20D+0.50Lr+0.50L+W	-42.192	16.536	Top	1.944	Min Temp %	2.640	172.050	0.245
+1.20D+0.50Lr+0.50L+W	-40.997	16.588	Top	1.944	Min Temp %	2.640	172.050	0.238
+1.20D+0.50Lr+0.50L+W	-39.793	16.639	Top	1.944	Min Temp %	2.640	172.050	0.231
+1.20D+0.50Lr+0.50L+W	-38.581	16.691	Top	1.944	Min Temp %	2.640	172.050	0.224
+1.20D+0.50Lr+0.50L+W	-37.362	16.743	Top	1.944	Min Temp %	2.640	172.050	0.217
+1.20D+0.50Lr+0.50L+W	-36.134	16.794	Top	1.944	Min Temp %	2.640	172.050	0.210
+1.20D+0.50Lr+0.50L+W	-34.898	16.846	Top	1.944	Min Temp %	2.640	172.050	0.203
+1.20D+0.50Lr+0.50L+W	-33.655	16.898	Top	1.944	Min Temp %	2.640	172.050	0.196
+1.20D+0.50Lr+0.50L+W	-32.404	16.949	Top	1.944	Min Temp %	2.640	172.050	0.188
+1.20D+0.50Lr+0.50L+W	-31.144	17.001	Top	1.944	Min Temp %	2.640	172.050	0.181
+1.20D+0.50Lr+0.50L+W	-29.877	17.053	Top	1.944	Min Temp %	2.640	172.050	0.174
+1.20D+0.50Lr+0.50L+W	-28.602	17.104	Top	1.944	Min Temp %	2.640	172.050	0.166
+1.20D+0.50Lr+0.50L+W	-27.320	17.156	Top	1.944	Min Temp %	2.640	172.050	0.159
+1.20D+0.50Lr+0.50L+W	-26.029	17.208	Top	1.944	Min Temp %	2.640	172.050	0.151
+1.20D+0.50Lr+0.50L+W	-24.731	17.259	Top	1.944	Min Temp %	2.640	172.050	0.144
+1.20D+0.50Lr+0.50L+W	-23.426	17.311	Top	1.944	Min Temp %	2.640	172.050	0.136
+1.20D+0.50Lr+0.50L+W	-22.112	17.363	Top	1.944	Min Temp %	2.640	172.050	0.129
+1.20D+0.50Lr+0.50L+W	-20.791	17.414	Top	1.944	Min Temp %	2.640	172.050	0.121
+1.20D+0.50Lr+0.50L+W	-19.462	17.466	Top	1.944	Min Temp %	2.640	172.050	0.113
+1.20D+0.50Lr+0.50L+W	-18.126	17.518	Top	1.944	Min Temp %	2.640	172.050	0.105
+1.20D+0.50Lr+0.50L+W	-16.783	17.570	Top	1.944	Min Temp %	2.640	172.050	0.098
+1.20D+0.50Lr+0.50L+W	-15.431	17.621	Top	1.944	Min Temp %	2.640	172.050	0.090
+1.20D+0.50Lr+0.50L+W	-14.073	17.673	Top	1.944	Min Temp %	2.640	172.050	0.082
+1.20D+0.50Lr+0.50L+W	-12.757	17.725	Top	1.944	Min Temp %	2.640	172.050	0.074
+1.20D+0.50Lr+0.50L+W	-11.523	17.776	Top	1.944	Min Temp %	2.640	172.050	0.067
+1.20D+0.50Lr+0.50L+W	-10.373	17.828	Top	1.944	Min Temp %	2.640	172.050	0.060
+1.20D+0.50Lr+0.50L+W	-9.305	17.880	Top	1.944	Min Temp %	2.640	172.050	0.054
+1.20D+0.50Lr+0.50L+W	-8.321	17.931	Top	1.944	Min Temp %	2.640	172.050	0.048
+1.20D+0.50Lr+0.50L+W	-7.419	17.983	Top	1.944	Min Temp %	2.640	172.050	0.043
+1.20D+0.50Lr+0.50L+W	-6.600	18.035	Top	1.944	Min Temp %	2.640	172.050	0.038
+1.20D+0.50Lr+0.50L+W	-5.864	18.086	Top	1.944	Min Temp %	2.640	172.050	0.034
+1.20D+0.50Lr+0.50L+W	-5.211	18.138	Top	1.944	Min Temp %	2.640	172.050	0.030
+1.20D+1.60L+0.50S	7.268	18.190	Bottom	1.944	Min Temp %	2.640	172.050	0.042
+1.20D+1.60L+0.50S	7.647	18.241	Bottom	1.944	Min Temp %	2.640	172.050	0.044
+1.20D+1.60L+0.50S	7.939	18.293	Bottom	1.944	Min Temp %	2.640	172.050	0.046
+1.20D+1.60L+0.50S	8.144	18.345	Bottom	1.944	Min Temp %	2.640	172.050	0.047
+1.20D+1.60L+0.50S	8.263	18.396	Bottom	1.944	Min Temp %	2.640	172.050	0.048
+1.20D+1.60L+0.50S	8.295	18.448	Bottom	1.944	Min Temp %	2.640	172.050	0.048
+1.20D+1.60L+0.50S	8.240	18.500	Bottom	1.944	Min Temp %	2.640	172.050	0.048
+1.20D+1.60L+0.50S	8.098	18.551	Bottom	1.944	Min Temp %	2.640	172.050	0.047
+1.20D+1.60L+0.50S	7.870	18.603	Bottom	1.944	Min Temp %	2.640	172.050	0.046
+1.20D+1.60L+0.50S	7.555	18.655	Bottom	1.944	Min Temp %	2.640	172.050	0.044
+1.20D+1.60L+0.50S	7.178	18.706	Bottom	1.944	Min Temp %	2.640	172.050	0.042
+1.20D+1.60L+0.50S	6.806	18.758	Bottom	1.944	Min Temp %	2.640	172.050	0.040
+1.20D+1.60L+0.50S	6.443	18.810	Bottom	1.944	Min Temp %	2.640	172.050	0.037
+1.20D+1.60L+0.50S	6.091	18.861	Bottom	1.944	Min Temp %	2.640	172.050	0.035
+1.20D+1.60L+0.50S	5.749	18.913	Bottom	1.944	Min Temp %	2.640	172.050	0.033
+1.20D+1.60L+0.50S	5.416	18.965	Bottom	1.944	Min Temp %	2.640	172.050	0.031
+1.20D+1.60L+0.50S	5.093	19.016	Bottom	1.944	Min Temp %	2.640	172.050	0.030
+1.20D+1.60L+0.50S	4.780	19.068	Bottom	1.944	Min Temp %	2.640	172.050	0.028
+1.20D+1.60L+0.50S	4.477	19.120	Bottom	1.944	Min Temp %	2.640	172.050	0.026
+1.20D+1.60L+0.50S	4.184	19.171	Bottom	1.944	Min Temp %	2.640	172.050	0.024
+1.20D+1.60L+0.50S	3.901	19.223	Bottom	1.944	Min Temp %	2.640	172.050	0.023
+1.20D+1.60L+0.50S	3.628	19.275	Bottom	1.944	Min Temp %	2.640	172.050	0.021

Project Title:
Engineer:
Project ID:
Project Descr:

Combined Footing

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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DESCRIPTION: Grid F

Z-Axis Footing Flexure - Maximum Values for Load Combination

Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+1.20D+1.60L+0.50S	3.364	19.326	Bottom	1.944	Min Temp %	2.640	172.050	0.020
+1.20D+1.60L+0.50S	3.111	19.378	Bottom	1.944	Min Temp %	2.640	172.050	0.018
+1.20D+1.60L+0.50S	2.867	19.430	Bottom	1.944	Min Temp %	2.640	172.050	0.017
+1.20D+1.60L+0.50S	2.634	19.481	Bottom	1.944	Min Temp %	2.640	172.050	0.015
+1.20D+1.60L+0.50S	2.410	19.533	Bottom	1.944	Min Temp %	2.640	172.050	0.014
+1.20D+1.60L+0.50S	2.196	19.585	Bottom	1.944	Min Temp %	2.640	172.050	0.013
+1.20D+1.60L+0.50S	1.992	19.637	Bottom	1.944	Min Temp %	2.640	172.050	0.012
+1.20D+1.60L+0.50S	1.798	19.688	Bottom	1.944	Min Temp %	2.640	172.050	0.010
+1.20D+1.60L+0.50S	1.614	19.740	Bottom	1.944	Min Temp %	2.640	172.050	0.009
+1.20D+1.60L+0.50S	1.440	19.792	Bottom	1.944	Min Temp %	2.640	172.050	0.008
+1.20D+1.60L+0.50S	1.275	19.843	Bottom	1.944	Min Temp %	2.640	172.050	0.007
+1.20D+1.60L+0.50S	1.121	19.895	Bottom	1.944	Min Temp %	2.640	172.050	0.007
+1.20D+1.60L+0.50S	0.977	19.947	Bottom	1.944	Min Temp %	2.640	172.050	0.006
+1.20D+1.60L+0.50S	0.842	19.998	Bottom	1.944	Min Temp %	2.640	172.050	0.005
+1.20D+1.60L+0.50S	0.718	20.050	Bottom	1.944	Min Temp %	2.640	172.050	0.004
+1.20D+1.60L+0.50S	0.603	20.102	Bottom	1.944	Min Temp %	2.640	172.050	0.004
+1.20D+1.60L+0.50S	0.499	20.153	Bottom	1.944	Min Temp %	2.640	172.050	0.003
+1.20D+1.60L+0.50S	0.404	20.205	Bottom	1.944	Min Temp %	2.640	172.050	0.002
+1.20D+1.60L+0.50S	0.319	20.257	Bottom	1.944	Min Temp %	2.640	172.050	0.002
+1.20D+1.60L+0.50S	0.244	20.308	Bottom	1.944	Min Temp %	2.640	172.050	0.001
+1.20D+1.60L+0.50S	0.180	20.360	Bottom	1.944	Min Temp %	2.640	172.050	0.001
+1.20D+1.60L+0.50S	0.125	20.412	Bottom	1.944	Min Temp %	2.640	172.050	0.001
+1.20D+1.60L+0.50S	0.080	20.463	Bottom	1.944	Min Temp %	2.640	172.050	0.000
+1.20D+1.60L+0.50S	0.045	20.515	Bottom	1.944	Min Temp %	2.640	172.050	0.000
+1.20D+1.60L+0.50S	0.020	20.567	Bottom	1.944	Min Temp %	2.640	172.050	0.000
+1.20D+1.60L+0.50S	0.000	20.618	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60L+0.50S	0.000	20.670	0	0.000	0	0.000	0.000	0.000
One Way Shear	Left of Column #1		Right of Column #1		Left of Column #2		Right of Column #2	

Load Combination...	vu (psi)	φ vn (psi)	vu / φ vn	vu (psi)	φ vn (psi)	vu / φ vn	vu (psi)	φ vn (psi)	vu / φ vn	vu (psi)	φ vn (psi)	vu / φ vn
+1.40D	2.8	82.2	0.034	23.5	82.2	0.286	3.0	82.2	0.037	22.4	82.2	0.272
+1.20D+0.50Lr+1.60L	3.8	82.2	0.046	28.6	82.2	0.348	3.1	82.2	0.037	25.2	82.2	0.307
+1.20D+1.60L+0.50S	2.8	82.2	0.034	24.7	82.2	0.300	3.2	82.2	0.039	22.8	82.2	0.278
+1.20D+1.60Lr+0.50L	5.4	82.2	0.066	34.7	82.2	0.422	2.5	82.2	0.030	27.4	82.2	0.334
+1.20D+1.60Lr+0.50W	6.3	82.2	0.077	37.2	82.2	0.453	1.9	82.2	0.024	27.6	82.2	0.336
+1.20D+0.50L+1.60S	2.4	82.2	0.029	22.1	82.2	0.269	2.9	82.2	0.035	19.8	82.2	0.241
+1.20D+1.60S+0.50W	3.3	82.2	0.040	24.6	82.2	0.300	2.4	82.2	0.029	19.9	82.2	0.243
+1.20D+0.50Lr+0.50L+W	5.5	82.2	0.067	33.4	82.2	0.406	1.9	82.2	0.024	25.3	82.2	0.308
+1.20D+0.50L+0.50S+W	4.6	82.2	0.056	29.4	82.2	0.358	2.1	82.2	0.025	22.9	82.2	0.278
+1.20D+0.50L+0.70S	2.5	82.2	0.030	21.8	82.2	0.265	2.8	82.2	0.035	20.1	82.2	0.245
+0.90D+W	3.9	82.2	0.047	22.9	82.2	0.278	1.2	82.2	0.015	17.1	82.2	0.208
+0.90D	1.8	82.2	0.022	15.1	82.2	0.184	2.0	82.2	0.024	14.4	82.2	0.175

Two Way Shear

Load Combination...	Column #1			Column #2		
	vu (psi)	φ vn (psi)	vu / φ vn	vu (psi)	φ vn (psi)	vu / φ vn
+1.40D	19.6	164.3	0.119	19.4	164.3	0.118
+1.20D+0.50Lr+1.60L	24.5	164.3	0.149	24.9	164.3	0.151
+1.20D+1.60L+0.50S	20.3	164.3	0.124	20.1	164.3	0.122
+1.20D+1.60Lr+0.50L	31.3	164.3	0.190	32.9	164.3	0.200
+1.20D+1.60Lr+0.50W	34.5	164.3	0.210	36.9	164.3	0.225
+1.20D+0.50L+1.60S	18.0	164.3	0.109	17.7	164.3	0.108
+1.20D+1.60S+0.50W	21.2	164.3	0.129	21.7	164.3	0.132
+1.20D+0.50Lr+0.50L+W	30.7	164.3	0.187	32.7	164.3	0.199

Project Title:
Engineer:
Project ID:
Project Descr:

Combined Footing

Project File: LS JOC 2.ec6
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LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

DESCRIPTION: [Grid F](#)

Two Way Shear

Load Combination...	Column #1			Column #2		
	vu (psi)	ϕ vn (psi)	vu / ϕ vn	vu (psi)	ϕ vn (psi)	vu / ϕ vn
+1.20D+0.50L+0.50S+W	26.5	164.3	0.161	27.9	164.3	0.170
+1.20D+0.50L+0.70S	17.9	164.3	0.109	17.7	164.3	0.108
+0.90D+W	21.2	164.3	0.129	22.7	164.3	0.138
+0.90D	12.6	164.3	0.077	12.5	164.3	0.076

Project Title:
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Project ID:
Project Descr:

Combined Footing

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LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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DESCRIPTION: Grid 6

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, SDPWS 2015
Load Combinations Used : IBC 2021

General Information

Material Properties

f'_c : Concrete 28 day strength	3.0 ksi
f_y : Rebar Yield	60.0 ksi
E_c : Concrete Elastic Modulus	3,122.0 ksi
Concrete Density	145.0 pcf
ϕ : Phi Values	Flexure : 0.90
	Shear : 0.750

Analysis/Design Settings

Calculate footing weight as dead load ?	Yes
Calculate Pedestal weight as dead load ?	No
Min Steel % Bending Reinf (based on 'd')	
Min Allow % Temp Reinf (based on thick)	0.00180
Min. Overturning Safety Factor	1.0: 1
Min. Sliding Safety Factor	1.0: 1

Soil Information

Allowable Soil Bearing	12.0 ksf
Increase Bearing By Footing Weight	No
Soil Passive Sliding Resistance	250.0 pcf
(Uses entry for "Footing base depth below soil surface" for force)	
Coefficient of Soil/Concrete Friction	0.350

Soil Bearing Increase

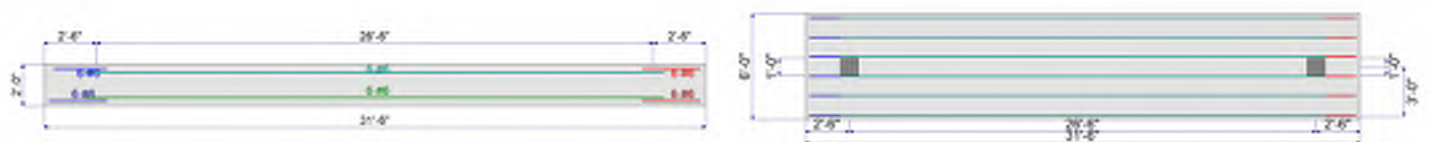
Footing base depth below soil surface	ft
Increases based on footing Depth	
Allowable pressure increase per foot	ksf
when base of footing is below	ft
Increases based on footing Width . . .	
Allowable pressure increase per foot	ksf
when maximum length or width is greater tha	ft
Maximum Allowed Bearing Pressure	10.0 ksf
(A value of zero implies no limit)	
Adjusted Allowable Soil Bearing	ksf
(Allowable Soil Bearing adjusted for footing weight and depth & width increases as specified by user.)	

Dimensions & Reinforcing

Distance Left of Column #1	=	2.50 ft	Pedestal dimensions...		Col #1	Col #2	Bars left of Col #1	Count	Size #	As Provided	As Req'd
Between Columns	=	26.50 ft									
Distance Right of Column #2	=	2.50 ft	Sq. Dim.	=	12.0	12.0 in	Bottom Bars	6.0	6	2.640	3.110 in^2
Total Footing Length	=	ft	Height	=			Top Bars	6.0	6	2.640	3.110 in^2
Footing Width	=	6.0 ft					Bars Btwn Cols				
Footing Thickness	=	24.0 in									
Rebar Center to Concrete Edge @ Top	=	3.0 in					Bars Right of Col #2				
Rebar Center to Concrete Edge @ Bottom	=	3.0 in									
							Bottom Bars	6.0	6	2.640	3.110 in^2
							Top Bars	6.0	6	2.640	0.0 in^2

Applied Loads

Applied @ Left Column	D	Lr	L	S	W	E	H
Axial Load Downward	=	8.20	15.40	3.90	10.440		k
Moment (+CW)	=						k-ft
Shear (+X)	=	5.090	0.0	5.090	0.0	7.20	k
Applied @ Right Column							
Axial Load Downward	=	25.0	3.920	3.850	7.150		k
Moment (+CW)	=						k-ft
Shear (+X)	=	1.90	-0.550	1.320	10.330		k
Overburden	=						



Project Title:
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Project Descr:

Combined Footing

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J&S STRUCTURAL ENGINEERS, P.A.

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DESCRIPTION: Grid 6

DESIGN SUMMARY

Design OK

Factor of Safety	Item	Applied	Capacity	Governing Load Combination	
PASS	30.265	Overturning	29.424 k-ft	890.52 k-ft	+0.60D+0.60W
PASS	1.507	Sliding	14.712 k	22.176 k	+0.60D+0.60W
PASS	No Uplift	Uplift	0.0 k	0.0 k	No Uplift

Utilization Ratio	Item	Applied	Capacity	Governing Load Combination	
PASS	0.078	Soil Bearing	0.7814 ksf	10.0 ksf	+D+0.750L+0.450W
PASS	0.231	1-way Shear - Col #1	19.0 psi	82.2 psi	+1.20D+1.60Lr+0.50W
PASS	0.218	1-way Shear - Col #2	17.9 psi	82.2 psi	+1.20D+1.60Lr+0.50W
PASS	0.080	2-way Punching - Col #1	13.2 psi	164.3 psi	+1.20D+1.60Lr+0.50W
PASS	0.079	2-way Punching - Col #2	13.2 psi	164.3 psi	+1.20D+1.60Lr+0.50W
PASS	0.004	Flexure - Left of Col #1 - Top	-0.8601 k-ft	244.355 k-ft	+1.40D
PASS	0.018	Flexure - Left of Col #1 - Bottom	4.507 k-ft	244.355 k-ft	+1.20D+1.60Lr+0.50W
PASS	0.864	Flexure - Between Cols - Top	-211.126 k-ft	244.355 k-ft	+1.20D+1.60Lr+0.50W
PASS	0.085	Flexure - Between Cols - Bottom	20.681 k-ft	244.355 k-ft	+1.20D+0.50L+W
PASS	No Bending	Flexure - Right of Col #2 - Top	0.0 k-ft	0.0 k-ft	N/A
PASS	0.028	Flexure - Right of Col #2 - Bottom	6.932 k-ft	244.355 k-ft	+1.20D+0.50L+W

Soil Bearing

Load Combination...	Total Bearing	Eccentricity from Ftg CL	Actual Soil Bearing Stress		Allowable	Actual / Allow Ratio
			@ Left Edge	@ Right Edge		
D Only	88.01 k	2.688 ft	0.23 ksf	0.70 ksf	10.00 ksf	0.070
+D+L	95.76 k	2.598 ft	0.26 ksf	0.76 ksf	10.00 ksf	0.076
+D+Lr	107.33 k	0.777 ft	0.48 ksf	0.65 ksf	10.00 ksf	0.065
+D+0.750Lr+0.750L	108.31 k	1.208 ft	0.44 ksf	0.70 ksf	10.00 ksf	0.070
+D+0.750L	93.82 k	2.619 ft	0.25 ksf	0.74 ksf	10.00 ksf	0.074
+D+0.60W	98.56 k	2.348 ft	0.29 ksf	0.75 ksf	10.00 ksf	0.075
+D+0.750Lr+0.750L+0.450W	116.23 k	1.092 ft	0.49 ksf	0.74 ksf	10.00 ksf	0.074
+D+0.750L+0.450W	101.74 k	2.377 ft	0.30 ksf	0.78 ksf	10.00 ksf	0.078
+0.60D+0.60W	63.36 k	2.160 ft	0.20 ksf	0.47 ksf	10.00 ksf	0.047
+0.60D	52.81 k	2.688 ft	0.14 ksf	0.42 ksf	10.00 ksf	0.042

Overturning Stability

Load Combination...	Moments about Left Edge k-ft			Moments about Right Edge k-ft		
	Overturning	Resisting	Ratio	Overturning	Resisting	Ratio
D Only	0.00	0.00	999.000	13.98	1,163.56	83.230
+D+L	0.00	0.00	999.000	26.80	1,286.28	47.996
+D+Lr	1.10	1,774.92	999.000	13.98	1,621.06	115.955
+D+0.750Lr+0.750L	0.83	1,837.54	999.000	23.60	1,598.73	67.757
+D+0.750L	0.00	0.00	999.000	23.60	1,255.60	53.215
+D+0.60W	0.00	0.00	999.000	35.02	1,355.94	38.723
+D+0.750Lr+0.750L+0.450W	0.83	1,958.37	999.000	39.37	1,743.01	44.270
+D+0.750L+0.450W	0.00	0.00	999.000	39.37	1,399.89	35.555
+0.60D+0.60W	0.00	0.00	999.000	29.42	890.52	30.265
+0.60D	0.00	0.00	999.000	8.39	698.13	83.230

Sliding Stability

Load Combination...	Sliding Force	Resisting Force	Sliding SafetyRatio
D Only	6.99 k	30.80 k	4.407
+D+L	13.40 k	33.52 k	2.501
+D+Lr	6.44 k	37.57 k	5.833
+D+0.750Lr+0.750L	11.39 k	37.91 k	3.33
+D+0.750L	11.80 k	32.84 k	2.783
+D+0.60W	17.51 k	34.50 k	1.97
+D+0.750Lr+0.750L+0.450W	19.27 k	40.68 k	2.111
+D+0.750L+0.450W	19.69 k	35.61 k	1.809
+0.60D+0.60W	14.71 k	22.18 k	1.507
+0.60D	4.19 k	18.48 k	4.407

Project Title:
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Project Descr:

Combined Footing

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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DESCRIPTION: Grid 6

Z-Axis Footing Flexure - Maximum Values for Load Combination

Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+0.60D	0.000	0.000	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.079	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60Lr+0.50W	0.029	0.158	Bottom	3.110	Min Temp %	2.640	244.355	0.000
+1.20D+1.60Lr+0.50W	0.065	0.236	Bottom	3.110	Min Temp %	2.640	244.355	0.000
+1.20D+1.60Lr+0.50W	0.115	0.315	Bottom	3.110	Min Temp %	2.640	244.355	0.000
+1.20D+1.60Lr+0.50W	0.180	0.394	Bottom	3.110	Min Temp %	2.640	244.355	0.001
+1.20D+1.60Lr+0.50W	0.259	0.473	Bottom	3.110	Min Temp %	2.640	244.355	0.001
+1.20D+1.60Lr+0.50W	0.352	0.551	Bottom	3.110	Min Temp %	2.640	244.355	0.001
+1.20D+1.60Lr+0.50W	0.460	0.630	Bottom	3.110	Min Temp %	2.640	244.355	0.002
+1.20D+1.60Lr+0.50W	0.583	0.709	Bottom	3.110	Min Temp %	2.640	244.355	0.002
+1.20D+1.60Lr+0.50W	0.719	0.788	Bottom	3.110	Min Temp %	2.640	244.355	0.003
+1.20D+1.60Lr+0.50W	0.871	0.866	Bottom	3.110	Min Temp %	2.640	244.355	0.004
+1.20D+1.60Lr+0.50W	1.036	0.945	Bottom	3.110	Min Temp %	2.640	244.355	0.004
+1.20D+1.60Lr+0.50W	1.216	1.024	Bottom	3.110	Min Temp %	2.640	244.355	0.005
+1.20D+1.60Lr+0.50W	1.411	1.103	Bottom	3.110	Min Temp %	2.640	244.355	0.006
+1.20D+1.60Lr+0.50W	1.620	1.181	Bottom	3.110	Min Temp %	2.640	244.355	0.007
+1.20D+1.60Lr+0.50W	1.843	1.260	Bottom	3.110	Min Temp %	2.640	244.355	0.008
+1.20D+1.60Lr+0.50W	2.081	1.339	Bottom	3.110	Min Temp %	2.640	244.355	0.009
+1.20D+1.60Lr+0.50W	2.334	1.418	Bottom	3.110	Min Temp %	2.640	244.355	0.010
+1.20D+1.60Lr+0.50W	2.601	1.496	Bottom	3.110	Min Temp %	2.640	244.355	0.011
+1.20D+1.60Lr+0.50W	2.882	1.575	Bottom	3.110	Min Temp %	2.640	244.355	0.012
+1.20D+1.60Lr+0.50W	3.178	1.654	Bottom	3.110	Min Temp %	2.640	244.355	0.013
+1.20D+1.60Lr+0.50W	3.488	1.733	Bottom	3.110	Min Temp %	2.640	244.355	0.014
+1.20D+1.60Lr+0.50W	3.813	1.811	Bottom	3.110	Min Temp %	2.640	244.355	0.016
+1.20D+1.60Lr+0.50W	4.153	1.890	Bottom	3.110	Min Temp %	2.640	244.355	0.017
+1.20D+1.60Lr+0.50W	4.507	1.969	Bottom	3.110	Min Temp %	2.640	244.355	0.018
+1.20D+1.60Lr+0.50W	4.830	2.048	Bottom	3.110	Min Temp %	2.640	244.355	0.020
+1.20D+1.60Lr+0.50W	4.942	2.126	Bottom	3.110	Min Temp %	2.640	244.355	0.020
+1.20D+1.60Lr+0.50W	4.821	2.205	Bottom	3.110	Min Temp %	2.640	244.355	0.020
+1.20D+1.60Lr+0.50W	4.470	2.284	Bottom	3.110	Min Temp %	2.640	244.355	0.018
+1.20D+1.60Lr+0.50W	3.886	2.363	Bottom	3.110	Min Temp %	2.640	244.355	0.016
+1.20D+1.60Lr+0.50W	3.071	2.441	Bottom	3.110	Min Temp %	2.640	244.355	0.013
+1.20D+0.50Lr+0.50L+W	31.090	2.520	Bottom	3.110	Min Temp %	2.640	244.355	0.127
+1.20D+0.50Lr+0.50L+W	29.996	2.599	Bottom	3.110	Min Temp %	2.640	244.355	0.123
+1.20D+0.50Lr+0.50L+W	28.724	2.678	Bottom	3.110	Min Temp %	2.640	244.355	0.118
+1.20D+0.50Lr+0.50L+W	27.274	2.756	Bottom	3.110	Min Temp %	2.640	244.355	0.112
+1.20D+0.50Lr+0.50L+W	25.646	2.835	Bottom	3.110	Min Temp %	2.640	244.355	0.105
+1.20D+0.50L+W	23.908	2.914	Bottom	3.110	Min Temp %	2.640	244.355	0.098
+1.20D+0.50L+W	22.334	2.993	Bottom	3.110	Min Temp %	2.640	244.355	0.091
+1.20D+0.50L+W	20.681	3.071	Bottom	3.110	Min Temp %	2.640	244.355	0.085
+1.20D+0.50L+W	19.032	3.150	Bottom	3.110	Min Temp %	2.640	244.355	0.078
+1.20D+0.50L+W	17.386	3.229	Bottom	3.110	Min Temp %	2.640	244.355	0.071
+1.20D+0.50L+W	15.743	3.308	Bottom	3.110	Min Temp %	2.640	244.355	0.064
+1.20D+0.50L+W	14.105	3.386	Bottom	3.110	Min Temp %	2.640	244.355	0.058
+1.20D+1.60L	12.738	3.465	Bottom	3.110	Min Temp %	2.640	244.355	0.052
+1.20D+1.60L	11.480	3.544	Bottom	3.110	Min Temp %	2.640	244.355	0.047
+1.20D+1.60L	10.223	3.623	Bottom	3.110	Min Temp %	2.640	244.355	0.042
+1.20D+1.60Lr+0.50W	-12.293	3.701	Top	3.110	Min Temp %	2.640	244.355	0.050
+1.20D+1.60Lr+0.50W	-14.730	3.780	Top	3.110	Min Temp %	2.640	244.355	0.060
+1.20D+1.60Lr+0.50W	-17.152	3.859	Top	3.110	Min Temp %	2.640	244.355	0.070
+1.20D+1.60Lr+0.50W	-19.559	3.938	Top	3.110	Min Temp %	2.640	244.355	0.080
+1.20D+1.60Lr+0.50W	-21.951	4.016	Top	3.110	Min Temp %	2.640	244.355	0.090
+1.20D+1.60Lr+0.50W	-24.329	4.095	Top	3.110	Min Temp %	2.640	244.355	0.100
+1.20D+1.60Lr+0.50W	-26.693	4.174	Top	3.110	Min Temp %	2.640	244.355	0.109
+1.20D+1.60Lr+0.50W	-29.041	4.253	Top	3.110	Min Temp %	2.640	244.355	0.119
+1.20D+1.60Lr+0.50W	-31.375	4.331	Top	3.110	Min Temp %	2.640	244.355	0.128
+1.20D+1.60Lr+0.50W	-33.694	4.410	Top	3.110	Min Temp %	2.640	244.355	0.138
+1.20D+1.60Lr+0.50W	-35.998	4.489	Top	3.110	Min Temp %	2.640	244.355	0.147
+1.20D+1.60Lr+0.50W	-38.288	4.568	Top	3.110	Min Temp %	2.640	244.355	0.157
+1.20D+1.60Lr+0.50W	-40.562	4.646	Top	3.110	Min Temp %	2.640	244.355	0.166
+1.20D+1.60Lr+0.50W	-42.823	4.725	Top	3.110	Min Temp %	2.640	244.355	0.175
+1.20D+1.60Lr+0.50W	-45.068	4.804	Top	3.110	Min Temp %	2.640	244.355	0.184
+1.20D+1.60Lr+0.50W	-47.298	4.883	Top	3.110	Min Temp %	2.640	244.355	0.194

Project Title:
Engineer:
Project ID:
Project Descr:

Combined Footing

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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DESCRIPTION: Grid 6

Z-Axis Footing Flexure - Maximum Values for Load Combination

Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+1.20D+1.60Lr+0.50W	-49.514	4.961	Top	3.110	Min Temp %	2.640	244.355	0.203
+1.20D+1.60Lr+0.50W	-51.715	5.040	Top	3.110	Min Temp %	2.640	244.355	0.212
+1.20D+1.60Lr+0.50W	-53.901	5.119	Top	3.110	Min Temp %	2.640	244.355	0.221
+1.20D+1.60Lr+0.50W	-56.073	5.198	Top	3.110	Min Temp %	2.640	244.355	0.229
+1.20D+1.60Lr+0.50W	-58.230	5.276	Top	3.110	Min Temp %	2.640	244.355	0.238
+1.20D+1.60Lr+0.50W	-60.371	5.355	Top	3.110	Min Temp %	2.640	244.355	0.247
+1.20D+1.60Lr+0.50W	-62.498	5.434	Top	3.110	Min Temp %	2.640	244.355	0.256
+1.20D+1.60Lr+0.50W	-64.611	5.513	Top	3.110	Min Temp %	2.640	244.355	0.264
+1.20D+1.60Lr+0.50W	-66.708	5.591	Top	3.110	Min Temp %	2.640	244.355	0.273
+1.20D+1.60Lr+0.50W	-68.791	5.670	Top	3.110	Min Temp %	2.640	244.355	0.282
+1.20D+1.60Lr+0.50W	-70.858	5.749	Top	3.110	Min Temp %	2.640	244.355	0.290
+1.20D+1.60Lr+0.50W	-72.911	5.828	Top	3.110	Min Temp %	2.640	244.355	0.298
+1.20D+1.60Lr+0.50W	-74.949	5.906	Top	3.110	Min Temp %	2.640	244.355	0.307
+1.20D+1.60Lr+0.50W	-76.973	5.985	Top	3.110	Min Temp %	2.640	244.355	0.315
+1.20D+1.60Lr+0.50W	-78.981	6.064	Top	3.110	Min Temp %	2.640	244.355	0.323
+1.20D+1.60Lr+0.50W	-80.974	6.143	Top	3.110	Min Temp %	2.640	244.355	0.331
+1.20D+1.60Lr+0.50W	-82.953	6.221	Top	3.110	Min Temp %	2.640	244.355	0.339
+1.20D+1.60Lr+0.50W	-84.917	6.300	Top	3.110	Min Temp %	2.640	244.355	0.348
+1.20D+1.60Lr+0.50W	-86.866	6.379	Top	3.110	Min Temp %	2.640	244.355	0.355
+1.20D+1.60Lr+0.50W	-88.800	6.457	Top	3.110	Min Temp %	2.640	244.355	0.363
+1.20D+1.60Lr+0.50W	-90.719	6.536	Top	3.110	Min Temp %	2.640	244.355	0.371
+1.20D+1.60Lr+0.50W	-92.623	6.615	Top	3.110	Min Temp %	2.640	244.355	0.379
+1.20D+1.60Lr+0.50W	-94.512	6.694	Top	3.110	Min Temp %	2.640	244.355	0.387
+1.20D+1.60Lr+0.50W	-96.386	6.772	Top	3.110	Min Temp %	2.640	244.355	0.394
+1.20D+1.60Lr+0.50W	-98.246	6.851	Top	3.110	Min Temp %	2.640	244.355	0.402
+1.20D+1.60Lr+0.50W	-100.090	6.930	Top	3.110	Min Temp %	2.640	244.355	0.410
+1.20D+1.60Lr+0.50W	-101.920	7.009	Top	3.110	Min Temp %	2.640	244.355	0.417
+1.20D+1.60Lr+0.50W	-103.734	7.087	Top	3.110	Min Temp %	2.640	244.355	0.425
+1.20D+1.60Lr+0.50W	-105.534	7.166	Top	3.110	Min Temp %	2.640	244.355	0.432
+1.20D+1.60Lr+0.50W	-107.319	7.245	Top	3.110	Min Temp %	2.640	244.355	0.439
+1.20D+1.60Lr+0.50W	-109.088	7.324	Top	3.110	Min Temp %	2.640	244.355	0.446
+1.20D+1.60Lr+0.50W	-110.843	7.402	Top	3.110	Min Temp %	2.640	244.355	0.454
+1.20D+1.60Lr+0.50W	-112.583	7.481	Top	3.110	Min Temp %	2.640	244.355	0.461
+1.20D+1.60Lr+0.50W	-114.308	7.560	Top	3.110	Min Temp %	2.640	244.355	0.468
+1.20D+1.60Lr+0.50W	-116.018	7.639	Top	3.110	Min Temp %	2.640	244.355	0.475
+1.20D+1.60Lr+0.50W	-117.712	7.717	Top	3.110	Min Temp %	2.640	244.355	0.482
+1.20D+1.60Lr+0.50W	-119.392	7.796	Top	3.110	Min Temp %	2.640	244.355	0.489
+1.20D+1.60Lr+0.50W	-121.057	7.875	Top	3.110	Min Temp %	2.640	244.355	0.495
+1.20D+1.60Lr+0.50W	-122.707	7.954	Top	3.110	Min Temp %	2.640	244.355	0.502
+1.20D+1.60Lr+0.50W	-124.342	8.032	Top	3.110	Min Temp %	2.640	244.355	0.509
+1.20D+1.60Lr+0.50W	-125.961	8.111	Top	3.110	Min Temp %	2.640	244.355	0.515
+1.20D+1.60Lr+0.50W	-127.566	8.190	Top	3.110	Min Temp %	2.640	244.355	0.522
+1.20D+1.60Lr+0.50W	-129.156	8.269	Top	3.110	Min Temp %	2.640	244.355	0.529
+1.20D+1.60Lr+0.50W	-130.730	8.347	Top	3.110	Min Temp %	2.640	244.355	0.535
+1.20D+1.60Lr+0.50W	-132.290	8.426	Top	3.110	Min Temp %	2.640	244.355	0.541
+1.20D+1.60Lr+0.50W	-133.835	8.505	Top	3.110	Min Temp %	2.640	244.355	0.548
+1.20D+1.60Lr+0.50W	-135.364	8.584	Top	3.110	Min Temp %	2.640	244.355	0.554
+1.20D+1.60Lr+0.50W	-136.878	8.662	Top	3.110	Min Temp %	2.640	244.355	0.560
+1.20D+1.60Lr+0.50W	-138.378	8.741	Top	3.110	Min Temp %	2.640	244.355	0.566
+1.20D+1.60Lr+0.50W	-139.862	8.820	Top	3.110	Min Temp %	2.640	244.355	0.572
+1.20D+1.60Lr+0.50W	-141.331	8.899	Top	3.110	Min Temp %	2.640	244.355	0.578
+1.20D+1.60Lr+0.50W	-142.785	8.977	Top	3.110	Min Temp %	2.640	244.355	0.584
+1.20D+1.60Lr+0.50W	-144.224	9.056	Top	3.110	Min Temp %	2.640	244.355	0.590
+1.20D+1.60Lr+0.50W	-145.648	9.135	Top	3.110	Min Temp %	2.640	244.355	0.596
+1.20D+1.60Lr+0.50W	-147.056	9.214	Top	3.110	Min Temp %	2.640	244.355	0.602
+1.20D+1.60Lr+0.50W	-148.450	9.292	Top	3.110	Min Temp %	2.640	244.355	0.608
+1.20D+1.60Lr+0.50W	-149.828	9.371	Top	3.110	Min Temp %	2.640	244.355	0.613
+1.20D+1.60Lr+0.50W	-151.192	9.450	Top	3.110	Min Temp %	2.640	244.355	0.619
+1.20D+1.60Lr+0.50W	-152.540	9.529	Top	3.110	Min Temp %	2.640	244.355	0.624
+1.20D+1.60Lr+0.50W	-153.873	9.607	Top	3.110	Min Temp %	2.640	244.355	0.630
+1.20D+1.60Lr+0.50W	-155.191	9.686	Top	3.110	Min Temp %	2.640	244.355	0.635
+1.20D+1.60Lr+0.50W	-156.493	9.765	Top	3.110	Min Temp %	2.640	244.355	0.640
+1.20D+1.60Lr+0.50W	-157.781	9.844	Top	3.110	Min Temp %	2.640	244.355	0.646

Project Title:
Engineer:
Project ID:
Project Descr:

Combined Footing

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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DESCRIPTION: Grid 6

Z-Axis Footing Flexure - Maximum Values for Load Combination

Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+1.20D+1.60Lr+0.50W	-159.053	9.922	Top	3.110	Min Temp %	2.640	244.355	0.651
+1.20D+1.60Lr+0.50W	-160.311	10.001	Top	3.110	Min Temp %	2.640	244.355	0.656
+1.20D+1.60Lr+0.50W	-161.552	10.080	Top	3.110	Min Temp %	2.640	244.355	0.661
+1.20D+1.60Lr+0.50W	-162.779	10.159	Top	3.110	Min Temp %	2.640	244.355	0.666
+1.20D+1.60Lr+0.50W	-163.991	10.238	Top	3.110	Min Temp %	2.640	244.355	0.671
+1.20D+1.60Lr+0.50W	-165.187	10.316	Top	3.110	Min Temp %	2.640	244.355	0.676
+1.20D+1.60Lr+0.50W	-166.368	10.395	Top	3.110	Min Temp %	2.640	244.355	0.681
+1.20D+1.60Lr+0.50W	-167.534	10.474	Top	3.110	Min Temp %	2.640	244.355	0.686
+1.20D+1.60Lr+0.50W	-168.685	10.553	Top	3.110	Min Temp %	2.640	244.355	0.690
+1.20D+1.60Lr+0.50W	-169.820	10.631	Top	3.110	Min Temp %	2.640	244.355	0.695
+1.20D+1.60Lr+0.50W	-170.941	10.710	Top	3.110	Min Temp %	2.640	244.355	0.700
+1.20D+1.60Lr+0.50W	-172.046	10.789	Top	3.110	Min Temp %	2.640	244.355	0.704
+1.20D+1.60Lr+0.50W	-173.135	10.868	Top	3.110	Min Temp %	2.640	244.355	0.709
+1.20D+1.60Lr+0.50W	-174.210	10.946	Top	3.110	Min Temp %	2.640	244.355	0.713
+1.20D+1.60Lr+0.50W	-175.269	11.025	Top	3.110	Min Temp %	2.640	244.355	0.717
+1.20D+1.60Lr+0.50W	-176.313	11.104	Top	3.110	Min Temp %	2.640	244.355	0.722
+1.20D+1.60Lr+0.50W	-177.342	11.183	Top	3.110	Min Temp %	2.640	244.355	0.726
+1.20D+1.60Lr+0.50W	-178.355	11.261	Top	3.110	Min Temp %	2.640	244.355	0.730
+1.20D+1.60Lr+0.50W	-179.353	11.340	Top	3.110	Min Temp %	2.640	244.355	0.734
+1.20D+1.60Lr+0.50W	-180.336	11.419	Top	3.110	Min Temp %	2.640	244.355	0.738
+1.20D+1.60Lr+0.50W	-181.303	11.498	Top	3.110	Min Temp %	2.640	244.355	0.742
+1.20D+1.60Lr+0.50W	-182.256	11.576	Top	3.110	Min Temp %	2.640	244.355	0.746
+1.20D+1.60Lr+0.50W	-183.192	11.655	Top	3.110	Min Temp %	2.640	244.355	0.750
+1.20D+1.60Lr+0.50W	-184.114	11.734	Top	3.110	Min Temp %	2.640	244.355	0.753
+1.20D+1.60Lr+0.50W	-185.020	11.813	Top	3.110	Min Temp %	2.640	244.355	0.757
+1.20D+1.60Lr+0.50W	-185.911	11.891	Top	3.110	Min Temp %	2.640	244.355	0.761
+1.20D+1.60Lr+0.50W	-186.786	11.970	Top	3.110	Min Temp %	2.640	244.355	0.764
+1.20D+1.60Lr+0.50W	-187.647	12.049	Top	3.110	Min Temp %	2.640	244.355	0.768
+1.20D+1.60Lr+0.50W	-188.491	12.128	Top	3.110	Min Temp %	2.640	244.355	0.771
+1.20D+1.60Lr+0.50W	-189.321	12.206	Top	3.110	Min Temp %	2.640	244.355	0.775
+1.20D+1.60Lr+0.50W	-190.135	12.285	Top	3.110	Min Temp %	2.640	244.355	0.778
+1.20D+1.60Lr+0.50W	-190.934	12.364	Top	3.110	Min Temp %	2.640	244.355	0.781
+1.20D+1.60Lr+0.50W	-191.717	12.443	Top	3.110	Min Temp %	2.640	244.355	0.785
+1.20D+1.60Lr+0.50W	-192.485	12.521	Top	3.110	Min Temp %	2.640	244.355	0.788
+1.20D+1.60Lr+0.50W	-193.237	12.600	Top	3.110	Min Temp %	2.640	244.355	0.791
+1.20D+1.60Lr+0.50W	-193.974	12.679	Top	3.110	Min Temp %	2.640	244.355	0.794
+1.20D+1.60Lr+0.50W	-194.696	12.757	Top	3.110	Min Temp %	2.640	244.355	0.797
+1.20D+1.60Lr+0.50W	-195.402	12.836	Top	3.110	Min Temp %	2.640	244.355	0.800
+1.20D+1.60Lr+0.50W	-196.093	12.915	Top	3.110	Min Temp %	2.640	244.355	0.802
+1.20D+1.60Lr+0.50W	-196.769	12.994	Top	3.110	Min Temp %	2.640	244.355	0.805
+1.20D+1.60Lr+0.50W	-197.429	13.072	Top	3.110	Min Temp %	2.640	244.355	0.808
+1.20D+1.60Lr+0.50W	-198.073	13.151	Top	3.110	Min Temp %	2.640	244.355	0.811
+1.20D+1.60Lr+0.50W	-198.703	13.230	Top	3.110	Min Temp %	2.640	244.355	0.813
+1.20D+1.60Lr+0.50W	-199.316	13.309	Top	3.110	Min Temp %	2.640	244.355	0.816
+1.20D+1.60Lr+0.50W	-199.914	13.387	Top	3.110	Min Temp %	2.640	244.355	0.818
+1.20D+1.60Lr+0.50W	-200.497	13.466	Top	3.110	Min Temp %	2.640	244.355	0.821
+1.20D+1.60Lr+0.50W	-201.064	13.545	Top	3.110	Min Temp %	2.640	244.355	0.823
+1.20D+1.60Lr+0.50W	-201.616	13.624	Top	3.110	Min Temp %	2.640	244.355	0.825
+1.20D+1.60Lr+0.50W	-202.153	13.702	Top	3.110	Min Temp %	2.640	244.355	0.827
+1.20D+1.60Lr+0.50W	-202.673	13.781	Top	3.110	Min Temp %	2.640	244.355	0.829
+1.20D+1.60Lr+0.50W	-203.179	13.860	Top	3.110	Min Temp %	2.640	244.355	0.831
+1.20D+1.60Lr+0.50W	-203.668	13.939	Top	3.110	Min Temp %	2.640	244.355	0.833
+1.20D+1.60Lr+0.50W	-204.143	14.017	Top	3.110	Min Temp %	2.640	244.355	0.835
+1.20D+1.60Lr+0.50W	-204.602	14.096	Top	3.110	Min Temp %	2.640	244.355	0.837
+1.20D+1.60Lr+0.50W	-205.045	14.175	Top	3.110	Min Temp %	2.640	244.355	0.839
+1.20D+1.60Lr+0.50W	-205.472	14.254	Top	3.110	Min Temp %	2.640	244.355	0.841
+1.20D+1.60Lr+0.50W	-205.885	14.332	Top	3.110	Min Temp %	2.640	244.355	0.843
+1.20D+1.60Lr+0.50W	-206.281	14.411	Top	3.110	Min Temp %	2.640	244.355	0.844
+1.20D+1.60Lr+0.50W	-206.662	14.490	Top	3.110	Min Temp %	2.640	244.355	0.846
+1.20D+1.60Lr+0.50W	-207.028	14.569	Top	3.110	Min Temp %	2.640	244.355	0.847
+1.20D+1.60Lr+0.50W	-207.378	14.647	Top	3.110	Min Temp %	2.640	244.355	0.849
+1.20D+1.60Lr+0.50W	-207.712	14.726	Top	3.110	Min Temp %	2.640	244.355	0.850
+1.20D+1.60Lr+0.50W	-208.031	14.805	Top	3.110	Min Temp %	2.640	244.355	0.851

Project Title:
Engineer:
Project ID:
Project Descr:

Combined Footing

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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DESCRIPTION: Grid 6

Z-Axis Footing Flexure - Maximum Values for Load Combination

Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+1.20D+1.60Lr+0.50W	-208.334	14.884	Top	3.110	Min Temp %	2.640	244.355	0.853
+1.20D+1.60Lr+0.50W	-208.622	14.962	Top	3.110	Min Temp %	2.640	244.355	0.854
+1.20D+1.60Lr+0.50W	-208.894	15.041	Top	3.110	Min Temp %	2.640	244.355	0.855
+1.20D+1.60Lr+0.50W	-209.150	15.120	Top	3.110	Min Temp %	2.640	244.355	0.856
+1.20D+1.60Lr+0.50W	-209.391	15.199	Top	3.110	Min Temp %	2.640	244.355	0.857
+1.20D+1.60Lr+0.50W	-209.617	15.277	Top	3.110	Min Temp %	2.640	244.355	0.858
+1.20D+1.60Lr+0.50W	-209.826	15.356	Top	3.110	Min Temp %	2.640	244.355	0.859
+1.20D+1.60Lr+0.50W	-210.020	15.435	Top	3.110	Min Temp %	2.640	244.355	0.859
+1.20D+1.60Lr+0.50W	-210.198	15.514	Top	3.110	Min Temp %	2.640	244.355	0.860
+1.20D+1.60Lr+0.50W	-210.361	15.592	Top	3.110	Min Temp %	2.640	244.355	0.861
+1.20D+1.60Lr+0.50W	-210.508	15.671	Top	3.110	Min Temp %	2.640	244.355	0.861
+1.20D+1.60Lr+0.50W	-210.640	15.750	Top	3.110	Min Temp %	2.640	244.355	0.862
+1.20D+1.60Lr+0.50W	-210.755	15.829	Top	3.110	Min Temp %	2.640	244.355	0.862
+1.20D+1.60Lr+0.50W	-210.855	15.907	Top	3.110	Min Temp %	2.640	244.355	0.863
+1.20D+1.60Lr+0.50W	-210.940	15.986	Top	3.110	Min Temp %	2.640	244.355	0.863
+1.20D+1.60Lr+0.50W	-211.008	16.065	Top	3.110	Min Temp %	2.640	244.355	0.864
+1.20D+1.60Lr+0.50W	-211.061	16.144	Top	3.110	Min Temp %	2.640	244.355	0.864
+1.20D+1.60Lr+0.50W	-211.099	16.222	Top	3.110	Min Temp %	2.640	244.355	0.864
+1.20D+1.60Lr+0.50W	-211.120	16.301	Top	3.110	Min Temp %	2.640	244.355	0.864
+1.20D+1.60Lr+0.50W	-211.126	16.380	Top	3.110	Min Temp %	2.640	244.355	0.864
+1.20D+1.60Lr+0.50W	-211.117	16.459	Top	3.110	Min Temp %	2.640	244.355	0.864
+1.20D+1.60Lr+0.50W	-211.091	16.537	Top	3.110	Min Temp %	2.640	244.355	0.864
+1.20D+1.60Lr+0.50W	-211.050	16.616	Top	3.110	Min Temp %	2.640	244.355	0.864
+1.20D+1.60Lr+0.50W	-210.993	16.695	Top	3.110	Min Temp %	2.640	244.355	0.863
+1.20D+1.60Lr+0.50W	-210.920	16.774	Top	3.110	Min Temp %	2.640	244.355	0.863
+1.20D+1.60Lr+0.50W	-210.832	16.852	Top	3.110	Min Temp %	2.640	244.355	0.863
+1.20D+1.60Lr+0.50W	-210.728	16.931	Top	3.110	Min Temp %	2.640	244.355	0.862
+1.20D+1.60Lr+0.50W	-210.608	17.010	Top	3.110	Min Temp %	2.640	244.355	0.862
+1.20D+1.60Lr+0.50W	-210.472	17.089	Top	3.110	Min Temp %	2.640	244.355	0.861
+1.20D+1.60Lr+0.50W	-210.320	17.167	Top	3.110	Min Temp %	2.640	244.355	0.861
+1.20D+1.60Lr+0.50W	-210.153	17.246	Top	3.110	Min Temp %	2.640	244.355	0.860
+1.20D+1.60Lr+0.50W	-209.970	17.325	Top	3.110	Min Temp %	2.640	244.355	0.859
+1.20D+1.60Lr+0.50W	-209.771	17.404	Top	3.110	Min Temp %	2.640	244.355	0.858
+1.20D+1.60Lr+0.50W	-209.557	17.482	Top	3.110	Min Temp %	2.640	244.355	0.858
+1.20D+1.60Lr+0.50W	-209.326	17.561	Top	3.110	Min Temp %	2.640	244.355	0.857
+1.20D+1.60Lr+0.50W	-209.080	17.640	Top	3.110	Min Temp %	2.640	244.355	0.856
+1.20D+1.60Lr+0.50W	-208.818	17.719	Top	3.110	Min Temp %	2.640	244.355	0.855
+1.20D+1.60Lr+0.50W	-208.540	17.797	Top	3.110	Min Temp %	2.640	244.355	0.853
+1.20D+1.60Lr+0.50W	-208.246	17.876	Top	3.110	Min Temp %	2.640	244.355	0.852
+1.20D+1.60Lr+0.50W	-207.937	17.955	Top	3.110	Min Temp %	2.640	244.355	0.851
+1.20D+1.60Lr+0.50W	-207.611	18.034	Top	3.110	Min Temp %	2.640	244.355	0.850
+1.20D+1.60Lr+0.50W	-207.270	18.112	Top	3.110	Min Temp %	2.640	244.355	0.848
+1.20D+1.60Lr+0.50W	-206.913	18.191	Top	3.110	Min Temp %	2.640	244.355	0.847
+1.20D+1.60Lr+0.50W	-206.540	18.270	Top	3.110	Min Temp %	2.640	244.355	0.845
+1.20D+1.60Lr+0.50W	-206.151	18.349	Top	3.110	Min Temp %	2.640	244.355	0.844
+1.20D+1.60Lr+0.50W	-205.746	18.427	Top	3.110	Min Temp %	2.640	244.355	0.842
+1.20D+1.60Lr+0.50W	-205.326	18.506	Top	3.110	Min Temp %	2.640	244.355	0.840
+1.20D+1.60Lr+0.50W	-204.889	18.585	Top	3.110	Min Temp %	2.640	244.355	0.838
+1.20D+1.60Lr+0.50W	-204.437	18.664	Top	3.110	Min Temp %	2.640	244.355	0.837
+1.20D+1.60Lr+0.50W	-203.969	18.742	Top	3.110	Min Temp %	2.640	244.355	0.835
+1.20D+1.60Lr+0.50W	-203.485	18.821	Top	3.110	Min Temp %	2.640	244.355	0.833
+1.20D+1.60Lr+0.50W	-202.984	18.900	Top	3.110	Min Temp %	2.640	244.355	0.831
+1.20D+1.60Lr+0.50W	-202.468	18.979	Top	3.110	Min Temp %	2.640	244.355	0.829
+1.20D+1.60Lr+0.50W	-201.937	19.057	Top	3.110	Min Temp %	2.640	244.355	0.826
+1.20D+1.60Lr+0.50W	-201.389	19.136	Top	3.110	Min Temp %	2.640	244.355	0.824
+1.20D+1.60Lr+0.50W	-200.825	19.215	Top	3.110	Min Temp %	2.640	244.355	0.822
+1.20D+1.60Lr+0.50W	-200.245	19.294	Top	3.110	Min Temp %	2.640	244.355	0.819
+1.20D+1.60Lr+0.50W	-199.649	19.372	Top	3.110	Min Temp %	2.640	244.355	0.817
+1.20D+1.60Lr+0.50W	-199.038	19.451	Top	3.110	Min Temp %	2.640	244.355	0.815
+1.20D+1.60Lr+0.50W	-198.410	19.530	Top	3.110	Min Temp %	2.640	244.355	0.812
+1.20D+1.60Lr+0.50W	-197.767	19.609	Top	3.110	Min Temp %	2.640	244.355	0.809
+1.20D+1.60Lr+0.50W	-197.107	19.687	Top	3.110	Min Temp %	2.640	244.355	0.807
+1.20D+1.60Lr+0.50W	-196.431	19.766	Top	3.110	Min Temp %	2.640	244.355	0.804

Project Title:
Engineer:
Project ID:
Project Descr:

Combined Footing

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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DESCRIPTION: Grid 6

Z-Axis Footing Flexure - Maximum Values for Load Combination

Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+1.20D+1.60Lr+0.50W	-195.740	19.845	Top	3.110	Min Temp %	2.640	244.355	0.801
+1.20D+1.60Lr+0.50W	-195.032	19.924	Top	3.110	Min Temp %	2.640	244.355	0.798
+1.20D+1.60Lr+0.50W	-194.309	20.002	Top	3.110	Min Temp %	2.640	244.355	0.795
+1.20D+1.60Lr+0.50W	-193.569	20.081	Top	3.110	Min Temp %	2.640	244.355	0.792
+1.20D+1.60Lr+0.50W	-192.814	20.160	Top	3.110	Min Temp %	2.640	244.355	0.789
+1.20D+1.60Lr+0.50W	-192.042	20.239	Top	3.110	Min Temp %	2.640	244.355	0.786
+1.20D+1.60Lr+0.50W	-191.254	20.317	Top	3.110	Min Temp %	2.640	244.355	0.783
+1.20D+1.60Lr+0.50W	-190.451	20.396	Top	3.110	Min Temp %	2.640	244.355	0.779
+1.20D+1.60Lr+0.50W	-189.631	20.475	Top	3.110	Min Temp %	2.640	244.355	0.776
+1.20D+1.60Lr+0.50W	-188.795	20.554	Top	3.110	Min Temp %	2.640	244.355	0.773
+1.20D+1.60Lr+0.50W	-187.944	20.632	Top	3.110	Min Temp %	2.640	244.355	0.769
+1.20D+1.60Lr+0.50W	-187.076	20.711	Top	3.110	Min Temp %	2.640	244.355	0.766
+1.20D+1.60Lr+0.50W	-186.192	20.790	Top	3.110	Min Temp %	2.640	244.355	0.762
+1.20D+1.60Lr+0.50W	-185.292	20.869	Top	3.110	Min Temp %	2.640	244.355	0.758
+1.20D+1.60Lr+0.50W	-184.376	20.947	Top	3.110	Min Temp %	2.640	244.355	0.755
+1.20D+1.60Lr+0.50W	-183.443	21.026	Top	3.110	Min Temp %	2.640	244.355	0.751
+1.20D+1.60Lr+0.50W	-182.495	21.105	Top	3.110	Min Temp %	2.640	244.355	0.747
+1.20D+1.60Lr+0.50W	-181.531	21.184	Top	3.110	Min Temp %	2.640	244.355	0.743
+1.20D+1.60Lr+0.50W	-180.550	21.262	Top	3.110	Min Temp %	2.640	244.355	0.739
+1.20D+1.60Lr+0.50W	-179.554	21.341	Top	3.110	Min Temp %	2.640	244.355	0.735
+1.20D+1.60Lr+0.50W	-178.541	21.420	Top	3.110	Min Temp %	2.640	244.355	0.731
+1.20D+1.60Lr+0.50W	-177.512	21.499	Top	3.110	Min Temp %	2.640	244.355	0.726
+1.20D+1.60Lr+0.50W	-176.467	21.577	Top	3.110	Min Temp %	2.640	244.355	0.722
+1.20D+1.60Lr+0.50W	-175.406	21.656	Top	3.110	Min Temp %	2.640	244.355	0.718
+1.20D+1.60Lr+0.50W	-174.329	21.735	Top	3.110	Min Temp %	2.640	244.355	0.713
+1.20D+1.60Lr+0.50W	-173.235	21.814	Top	3.110	Min Temp %	2.640	244.355	0.709
+1.20D+1.60Lr+0.50W	-172.126	21.892	Top	3.110	Min Temp %	2.640	244.355	0.704
+1.20D+1.60Lr+0.50W	-171.000	21.971	Top	3.110	Min Temp %	2.640	244.355	0.700
+1.20D+1.60Lr+0.50W	-169.858	22.050	Top	3.110	Min Temp %	2.640	244.355	0.695
+1.20D+1.60Lr+0.50W	-168.700	22.129	Top	3.110	Min Temp %	2.640	244.355	0.690
+1.20D+1.60Lr+0.50W	-167.526	22.207	Top	3.110	Min Temp %	2.640	244.355	0.686
+1.20D+1.60Lr+0.50W	-166.335	22.286	Top	3.110	Min Temp %	2.640	244.355	0.681
+1.20D+1.60Lr+0.50W	-165.129	22.365	Top	3.110	Min Temp %	2.640	244.355	0.676
+1.20D+1.60Lr+0.50W	-163.906	22.444	Top	3.110	Min Temp %	2.640	244.355	0.671
+1.20D+1.60Lr+0.50W	-162.667	22.522	Top	3.110	Min Temp %	2.640	244.355	0.666
+1.20D+1.60Lr+0.50W	-161.411	22.601	Top	3.110	Min Temp %	2.640	244.355	0.661
+1.20D+1.60Lr+0.50W	-160.140	22.680	Top	3.110	Min Temp %	2.640	244.355	0.655
+1.20D+1.60Lr+0.50W	-158.852	22.759	Top	3.110	Min Temp %	2.640	244.355	0.650
+1.20D+1.60Lr+0.50W	-157.548	22.837	Top	3.110	Min Temp %	2.640	244.355	0.645
+1.20D+1.60Lr+0.50W	-156.228	22.916	Top	3.110	Min Temp %	2.640	244.355	0.639
+1.20D+1.60Lr+0.50W	-154.891	22.995	Top	3.110	Min Temp %	2.640	244.355	0.634
+1.20D+1.60Lr+0.50W	-153.539	23.074	Top	3.110	Min Temp %	2.640	244.355	0.628
+1.20D+1.60Lr+0.50W	-152.170	23.152	Top	3.110	Min Temp %	2.640	244.355	0.623
+1.20D+1.60Lr+0.50W	-150.784	23.231	Top	3.110	Min Temp %	2.640	244.355	0.617
+1.20D+0.50Lr+0.50L+W	-149.582	23.310	Top	3.110	Min Temp %	2.640	244.355	0.612
+1.20D+0.50Lr+0.50L+W	-148.386	23.389	Top	3.110	Min Temp %	2.640	244.355	0.607
+1.20D+0.50Lr+0.50L+W	-147.172	23.467	Top	3.110	Min Temp %	2.640	244.355	0.602
+1.20D+0.50Lr+0.50L+W	-145.941	23.546	Top	3.110	Min Temp %	2.640	244.355	0.597
+1.20D+0.50Lr+0.50L+W	-144.691	23.625	Top	3.110	Min Temp %	2.640	244.355	0.592
+1.20D+0.50Lr+0.50L+W	-143.424	23.704	Top	3.110	Min Temp %	2.640	244.355	0.587
+1.20D+0.50Lr+0.50L+W	-142.139	23.782	Top	3.110	Min Temp %	2.640	244.355	0.582
+1.20D+0.50Lr+0.50L+W	-140.836	23.861	Top	3.110	Min Temp %	2.640	244.355	0.576
+1.20D+0.50Lr+0.50L+W	-139.515	23.940	Top	3.110	Min Temp %	2.640	244.355	0.571
+1.20D+0.50Lr+0.50L+W	-138.176	24.019	Top	3.110	Min Temp %	2.640	244.355	0.565
+1.20D+0.50Lr+0.50L+W	-136.819	24.097	Top	3.110	Min Temp %	2.640	244.355	0.560
+1.20D+0.50Lr+0.50L+W	-135.445	24.176	Top	3.110	Min Temp %	2.640	244.355	0.554
+1.20D+0.50Lr+0.50L+W	-134.052	24.255	Top	3.110	Min Temp %	2.640	244.355	0.549
+1.20D+0.50Lr+0.50L+W	-132.641	24.334	Top	3.110	Min Temp %	2.640	244.355	0.543
+1.20D+0.50Lr+0.50L+W	-131.211	24.412	Top	3.110	Min Temp %	2.640	244.355	0.537
+1.20D+0.50Lr+0.50L+W	-129.764	24.491	Top	3.110	Min Temp %	2.640	244.355	0.531
+1.20D+0.50Lr+0.50L+W	-128.298	24.570	Top	3.110	Min Temp %	2.640	244.355	0.525
+1.20D+0.50Lr+0.50L+W	-126.814	24.649	Top	3.110	Min Temp %	2.640	244.355	0.519
+1.20D+0.50Lr+0.50L+W	-125.312	24.727	Top	3.110	Min Temp %	2.640	244.355	0.513

Project Title:
Engineer:
Project ID:
Project Descr:

Combined Footing

Project File: LS JOC 2.ec6

LIC#: KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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DESCRIPTION: Grid 6

Z-Axis Footing Flexure - Maximum Values for Load Combination

Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+1.20D+0.50Lr+0.50L+W	-123.792	24.806	Top	3.110	Min Temp %	2.640	244.355	0.507
+1.20D+0.50Lr+0.50L+W	-122.253	24.885	Top	3.110	Min Temp %	2.640	244.355	0.500
+1.20D+0.50Lr+0.50L+W	-120.695	24.964	Top	3.110	Min Temp %	2.640	244.355	0.494
+1.20D+0.50Lr+0.50L+W	-119.119	25.042	Top	3.110	Min Temp %	2.640	244.355	0.487
+1.20D+0.50Lr+0.50L+W	-117.525	25.121	Top	3.110	Min Temp %	2.640	244.355	0.481
+1.20D+0.50Lr+0.50L+W	-115.912	25.200	Top	3.110	Min Temp %	2.640	244.355	0.474
+1.20D+0.50Lr+0.50L+W	-114.280	25.279	Top	3.110	Min Temp %	2.640	244.355	0.468
+1.20D+0.50Lr+0.50L+W	-112.630	25.357	Top	3.110	Min Temp %	2.640	244.355	0.461
+1.20D+0.50Lr+0.50L+W	-110.962	25.436	Top	3.110	Min Temp %	2.640	244.355	0.454
+1.20D+0.50Lr+0.50L+W	-109.274	25.515	Top	3.110	Min Temp %	2.640	244.355	0.447
+1.20D+0.50Lr+0.50L+W	-107.568	25.594	Top	3.110	Min Temp %	2.640	244.355	0.440
+1.20D+0.50Lr+0.50L+W	-105.843	25.672	Top	3.110	Min Temp %	2.640	244.355	0.433
+1.20D+0.50Lr+0.50L+W	-104.099	25.751	Top	3.110	Min Temp %	2.640	244.355	0.426
+1.20D+0.50Lr+0.50L+W	-102.337	25.830	Top	3.110	Min Temp %	2.640	244.355	0.419
+1.20D+0.50Lr+0.50L+W	-100.555	25.909	Top	3.110	Min Temp %	2.640	244.355	0.412
+1.20D+0.50Lr+0.50L+W	-98.755	25.987	Top	3.110	Min Temp %	2.640	244.355	0.404
+1.20D+0.50Lr+0.50L+W	-96.935	26.066	Top	3.110	Min Temp %	2.640	244.355	0.397
+1.20D+0.50Lr+0.50L+W	-95.097	26.145	Top	3.110	Min Temp %	2.640	244.355	0.389
+1.20D+0.50Lr+0.50L+W	-93.239	26.224	Top	3.110	Min Temp %	2.640	244.355	0.382
+1.20D+0.50Lr+0.50L+W	-91.363	26.302	Top	3.110	Min Temp %	2.640	244.355	0.374
+1.20D+0.50Lr+0.50L+W	-89.467	26.381	Top	3.110	Min Temp %	2.640	244.355	0.366
+1.20D+0.50Lr+0.50L+W	-87.552	26.460	Top	3.110	Min Temp %	2.640	244.355	0.358
+1.20D+0.50Lr+0.50L+W	-85.618	26.539	Top	3.110	Min Temp %	2.640	244.355	0.350
+1.20D+0.50Lr+0.50L+W	-83.665	26.617	Top	3.110	Min Temp %	2.640	244.355	0.342
+1.20D+0.50Lr+0.50L+W	-81.693	26.696	Top	3.110	Min Temp %	2.640	244.355	0.334
+1.20D+0.50Lr+0.50L+W	-79.701	26.775	Top	3.110	Min Temp %	2.640	244.355	0.326
+1.20D+0.50Lr+0.50L+W	-77.690	26.854	Top	3.110	Min Temp %	2.640	244.355	0.318
+1.20D+0.50Lr+0.50L+W	-75.659	26.932	Top	3.110	Min Temp %	2.640	244.355	0.310
+1.20D+0.50Lr+0.50L+W	-73.609	27.011	Top	3.110	Min Temp %	2.640	244.355	0.301
+1.20D+0.50Lr+0.50L+W	-71.540	27.090	Top	3.110	Min Temp %	2.640	244.355	0.293
+1.20D+0.50Lr+0.50L+W	-69.451	27.169	Top	3.110	Min Temp %	2.640	244.355	0.284
+1.20D+0.50Lr+0.50L+W	-67.342	27.247	Top	3.110	Min Temp %	2.640	244.355	0.276
+1.20D+0.50Lr+0.50L+W	-65.214	27.326	Top	3.110	Min Temp %	2.640	244.355	0.267
+1.20D+0.50Lr+0.50L+W	-63.067	27.405	Top	3.110	Min Temp %	2.640	244.355	0.258
+1.20D+0.50Lr+0.50L+W	-60.899	27.484	Top	3.110	Min Temp %	2.640	244.355	0.249
+1.20D+0.50Lr+0.50L+W	-58.712	27.562	Top	3.110	Min Temp %	2.640	244.355	0.240
+1.20D+0.50Lr+0.50L+W	-56.505	27.641	Top	3.110	Min Temp %	2.640	244.355	0.231
+1.20D+0.50Lr+0.50L+W	-54.279	27.720	Top	3.110	Min Temp %	2.640	244.355	0.222
+1.20D+0.50Lr+0.50L+W	-52.033	27.799	Top	3.110	Min Temp %	2.640	244.355	0.213
+1.20D+0.50Lr+0.50L+W	-49.766	27.877	Top	3.110	Min Temp %	2.640	244.355	0.204
+1.20D+0.50Lr+0.50L+W	-47.480	27.956	Top	3.110	Min Temp %	2.640	244.355	0.194
+1.20D+0.50Lr+0.50L+W	-45.174	28.035	Top	3.110	Min Temp %	2.640	244.355	0.185
+1.20D+0.50Lr+0.50L+W	-42.848	28.114	Top	3.110	Min Temp %	2.640	244.355	0.175
+1.20D+0.50Lr+0.50L+W	-40.502	28.192	Top	3.110	Min Temp %	2.640	244.355	0.166
+1.20D+0.50Lr+0.50L+W	-38.136	28.271	Top	3.110	Min Temp %	2.640	244.355	0.156
+1.20D+0.50Lr+0.50L+W	-35.750	28.350	Top	3.110	Min Temp %	2.640	244.355	0.146
+1.20D+0.50Lr+0.50L+W	-33.344	28.429	Top	3.110	Min Temp %	2.640	244.355	0.136
+1.20D+0.50Lr+0.50L+W	-30.919	28.507	Top	3.110	Min Temp %	2.640	244.355	0.127
+1.20D+0.50Lr+0.50L+W	-28.624	28.586	Top	3.110	Min Temp %	2.640	244.355	0.117
+1.20D+0.50Lr+0.50L+W	-26.563	28.665	Top	3.110	Min Temp %	2.640	244.355	0.109
+1.20D+0.50Lr+0.50L+W	-24.736	28.744	Top	3.110	Min Temp %	2.640	244.355	0.101
+1.20D+0.50Lr+0.50L+W	-23.144	28.822	Top	3.110	Min Temp %	2.640	244.355	0.095
+1.20D+0.50Lr+0.50L+W	-21.786	28.901	Top	3.110	Min Temp %	2.640	244.355	0.089
+1.20D+0.50Lr+0.50L+W	-20.662	28.980	Top	3.110	Min Temp %	2.640	244.355	0.085
+1.20D+0.50L+W	6.805	29.059	Bottom	3.110	Min Temp %	2.640	244.355	0.028
+1.20D+0.50L+W	7.376	29.137	Bottom	3.110	Min Temp %	2.640	244.355	0.030
+1.20D+0.50L+W	7.726	29.216	Bottom	3.110	Min Temp %	2.640	244.355	0.032
+1.20D+0.50L+W	7.854	29.295	Bottom	3.110	Min Temp %	2.640	244.355	0.032
+1.20D+0.50L+W	7.762	29.374	Bottom	3.110	Min Temp %	2.640	244.355	0.032
+1.20D+0.50L+W	7.448	29.452	Bottom	3.110	Min Temp %	2.640	244.355	0.030
+1.20D+0.50L+W	6.932	29.531	Bottom	3.110	Min Temp %	2.640	244.355	0.028
+1.20D+0.50L+W	6.394	29.610	Bottom	3.110	Min Temp %	2.640	244.355	0.026
+1.20D+0.50L+W	5.877	29.689	Bottom	3.110	Min Temp %	2.640	244.355	0.024

Project Title:
Engineer:
Project ID:
Project Descr:

Combined Footing

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Grid 6

Z-Axis Footing Flexure - Maximum Values for Load Combination

Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+1.20D+0.50L+W	5.381	29.767	Bottom	3.110	Min Temp %	2.640	244.355	0.022
+1.20D+0.50L+W	4.907	29.846	Bottom	3.110	Min Temp %	2.640	244.355	0.020
+1.20D+0.50L+W	4.454	29.925	Bottom	3.110	Min Temp %	2.640	244.355	0.018
+1.20D+0.50L+W	4.023	30.004	Bottom	3.110	Min Temp %	2.640	244.355	0.016
+1.20D+0.50L+W	3.614	30.082	Bottom	3.110	Min Temp %	2.640	244.355	0.015
+1.20D+0.50L+W	3.226	30.161	Bottom	3.110	Min Temp %	2.640	244.355	0.013
+1.20D+0.50L+W	2.860	30.240	Bottom	3.110	Min Temp %	2.640	244.355	0.012
+1.20D+0.50L+W	2.515	30.319	Bottom	3.110	Min Temp %	2.640	244.355	0.010
+1.20D+0.50L+W	2.193	30.397	Bottom	3.110	Min Temp %	2.640	244.355	0.009
+1.20D+0.50L+W	1.892	30.476	Bottom	3.110	Min Temp %	2.640	244.355	0.008
+1.20D+0.50L+W	1.614	30.555	Bottom	3.110	Min Temp %	2.640	244.355	0.007
+1.20D+0.50L+W	1.357	30.634	Bottom	3.110	Min Temp %	2.640	244.355	0.006
+1.20D+0.50L+W	1.122	30.712	Bottom	3.110	Min Temp %	2.640	244.355	0.005
+1.20D+0.50L+W	0.910	30.791	Bottom	3.110	Min Temp %	2.640	244.355	0.004
+1.20D+0.50L+W	0.719	30.870	Bottom	3.110	Min Temp %	2.640	244.355	0.003
+1.20D+0.50L+W	0.551	30.949	Bottom	3.110	Min Temp %	2.640	244.355	0.002
+1.20D+0.50L+W	0.405	31.027	Bottom	3.110	Min Temp %	2.640	244.355	0.002
+1.20D+0.50L+W	0.282	31.106	Bottom	3.110	Min Temp %	2.640	244.355	0.001
+1.20D+0.50L+W	0.180	31.185	Bottom	3.110	Min Temp %	2.640	244.355	0.001
+1.20D+0.50L+W	0.102	31.264	Bottom	3.110	Min Temp %	2.640	244.355	0.000
+1.20D+0.50L+W	0.045	31.342	Bottom	3.110	Min Temp %	2.640	244.355	0.000
+1.20D+0.50L+W	0.011	31.421	Bottom	3.110	Min Temp %	2.640	244.355	0.000
+1.20D+0.50L+W	0.000	31.500	0	0.000	0	0.000	0.000	0.000
One Way Shear	Left of Column #1		Right of Column #1		Left of Column #2		Right of Column #2	

Load Combination...	vu (psi)	φ vn (psi)	vu / φ vn	vu (psi)	φ vn (psi)	vu / φ vn	vu (psi)	φ vn (psi)	vu / φ vn	vu (psi)	φ vn (psi)	vu / φ vn
+1.40D	0.1	82.2	0.001	8.3	82.2	0.102	0.5	82.2	0.006	13.3	82.2	0.161
+1.20D+0.50Lr+1.60L	0.1	82.2	0.001	13.3	82.2	0.161	0.5	82.2	0.006	15.5	82.2	0.188
+1.20D+1.60L	0.0	82.2	0.001	10.4	82.2	0.126	0.5	82.2	0.006	13.9	82.2	0.169
+1.20D+1.60Lr+0.50L	0.3	82.2	0.004	17.4	82.2	0.212	0.4	82.2	0.005	17.2	82.2	0.209
+1.20D+1.60Lr+0.50W	0.3	82.2	0.004	19.0	82.2	0.231	0.4	82.2	0.005	17.9	82.2	0.218
+1.20D+0.50L	0.1	82.2	0.001	8.2	82.2	0.099	0.5	82.2	0.006	12.2	82.2	0.148
+1.20D+0.50W	0.0	82.2	0.000	9.7	82.2	0.118	0.5	82.2	0.006	12.9	82.2	0.157
+1.20D+0.50Lr+0.50L+W	0.1	82.2	0.002	16.1	82.2	0.196	0.5	82.2	0.006	16.8	82.2	0.205
+1.20D+0.50L+W	0.0	82.2	0.000	13.2	82.2	0.160	0.5	82.2	0.007	15.3	82.2	0.186
+0.90D+W	0.0	82.2	0.000	10.4	82.2	0.126	0.4	82.2	0.005	11.6	82.2	0.142
+0.90D	0.1	82.2	0.001	5.4	82.2	0.065	0.3	82.2	0.004	8.5	82.2	0.104

Two Way Shear

Load Combination...	Column #1			Column #2		
	vu (psi)	φ vn (psi)	vu / φ vn	vu (psi)	φ vn (psi)	vu / φ vn
+1.40D	4.2	164.3	0.026	2.7	164.3	0.016
+1.20D+0.50Lr+1.60L	8.2	164.3	0.050	7.1	164.3	0.043
+1.20D+1.60L	5.7	164.3	0.035	4.3	164.3	0.026
+1.20D+1.60Lr+0.50L	12.1	164.3	0.074	11.9	164.3	0.073
+1.20D+1.60Lr+0.50W	13.2	164.3	0.080	13.1	164.3	0.079
+1.20D+0.50L	4.3	164.3	0.026	2.9	164.3	0.018
+1.20D+0.50W	5.4	164.3	0.033	4.0	164.3	0.025
+1.20D+0.50Lr+0.50L+W	10.2	164.3	0.062	9.3	164.3	0.056
+1.20D+0.50L+W	7.8	164.3	0.047	6.4	164.3	0.039
+0.90D+W	6.2	164.3	0.038	5.2	164.3	0.032
+0.90D	2.7	164.3	0.017	1.7	164.3	0.010

Project Grid Lines

No Data to Print...

Project Grid Arcs

No Data to Print...

Node Coordinates

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
1	F1	0	0	0	
2	F2	10.92	0	0	
3	F3	25.92	0	0	
4	M1	0	15.33	0	
5	M2	10.92	15.33	0	
6	M3	25.92	15.33	0	
7	R1	0	32	0	
8	R3	25.92	32	0	
9	N11	12.96	23.665	0	

Node Boundary Conditions

	Node Label	X [k/in]	Y [k/in]	Z [k/in]
1	F1	Reaction	Reaction	Reaction
2	R3			Reaction
3	R1			Reaction
4	M1			Reaction
5	M3			Reaction
6	M2			Reaction
7	F2	Reaction	Reaction	Reaction
8	F3	Reaction	Reaction	Reaction

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in ²]	I _{yy} [in ⁴]	I _{zz} [in ⁴]	J [in ⁴]
1	HR1	W10X33	Beam	Wide Flange	A992	Typical	9.71	36.6	171	0.583

Member Primary Data

	Label	I Node	J Node	Section/Shape	Type	Design List	Material	Design Rule
1	M1	F1	M1	HSS5X5X5	Column	Tube	A500 Gr.B RECT	Typical
2	M2	M1	R1	HSS5X5X5	Column	Tube	A500 Gr.B RECT	Typical
3	M3	F2	M2	HSS5X5X5	Column	Tube	A500 Gr.B RECT	Typical
4	M4	F3	M3	HSS5X5X5	Column	Tube	A500 Gr.B RECT	Typical
5	M5	M3	R3	HSS5X5X5	Column	Tube	A500 Gr.B RECT	Typical
6	M6	R1	R3	W18X40	Beam	Wide Flange	A992	Typical
7	M7	M1	M2	W14X30	Beam	Wide Flange	A992	Typical
8	M8	M2	M3	W14X30	Beam	Wide Flange	A992	Typical
9	M9	R1	N11	HSS5X5X5	VBrace	Tube	A500 Gr.B RECT	Typical
10	M10	M1	F2	HSS5X5X5	VBrace	Tube	A500 Gr.B RECT	Typical
11	M11	F2	M3	HSS5X5X5	VBrace	Tube	A500 Gr.B RECT	Typical
12	M12	N11	M3	HSS5X5X5	VBrace	Tube	A500 Gr.B RECT	Typical
13	M13	M1	N11	HSS5X5X5	VBrace	Tube	A500 Gr.B RECT	Typical
14	M14	N11	R3	HSS5X5X5	VBrace	Tube	A500 Gr.B RECT	Typical

Member Advanced Data

	Label	I Release	J Release	Physical	Deflection Ratio Options	Seismic DR
1	M1			Yes	** NA **	None
2	M2			Yes	** NA **	None
3	M3			Yes	** NA **	None
4	M4			Yes	** NA **	None
5	M5			Yes	** NA **	None
6	M6	BenPIN	BenPIN	Yes	Default	None
7	M7	BenPIN	BenPIN	Yes	Default	None
8	M8	BenPIN	BenPIN	Yes	Default	None
9	M9	BenPIN		Yes	** NA **	None
10	M10	BenPIN	BenPIN	Yes	** NA **	None
11	M11	BenPIN	BenPIN	Yes	** NA **	None

Member Advanced Data (Continued)

	Label	I Release	J Release	Physical	Deflection Ratio Options	Seismic DR
12	M12		BenPIN	Yes	** NA **	None
13	M13	BenPIN	BenPIN	Yes	** NA **	None
14	M14	BenPIN	BenPIN	Yes	** NA **	None

Hot Rolled Steel Design Parameters

	Label	Shape	Length [ft]	Lb z-z [ft]	Lcomp top [ft]	L-Torque [ft]	Channel Conn.	a [ft]	Function
1	M1	HSS5X5X5	15.33		Lbyy		N/A	N/A	Lateral
2	M2	HSS5X5X5	16.67		Lbyy		N/A	N/A	Lateral
3	M3	HSS5X5X5	15.33		Lbyy		N/A	N/A	Lateral
4	M4	HSS5X5X5	15.33		Lbyy		N/A	N/A	Lateral
5	M5	HSS5X5X5	16.67		Lbyy		N/A	N/A	Lateral
6	M6	W18X40	25.92	1	1	1	N/A	N/A	Lateral
7	M7	W14X30	10.92	1	1	1	N/A	N/A	Lateral
8	M8	W14X30	15	1	1	1	N/A	N/A	Lateral
9	M9	HSS5X5X5	15.409		Lbyy		N/A	N/A	Lateral
10	M10	HSS5X5X5	18.822		Lbyy		N/A	N/A	Lateral
11	M11	HSS5X5X5	21.448		Lbyy		N/A	N/A	Lateral
12	M12	HSS5X5X5	15.409		Lbyy		N/A	N/A	Lateral
13	M13	HSS5X5X5	15.409		Lbyy		N/A	N/A	Lateral
14	M14	HSS5X5X5	15.409		Lbyy		N/A	N/A	Lateral

Design Size and Code Check Parameters

	Label	Max Axial/Bending Chk	Max Shear Chk
1	Typical	1	1

Concrete Rebar Parameters

	Label	Optimize Rebar ?	Min Flex Bar	Max Flex Bar	Shear Bar	Legs per Stirrup	Top (Column) Cover [in]	Bottom Cover [in]	Side Cover [in]	Top/Bottom Bars	Add'l Side Bars	Shear Bar Spacing [in]
1	Typical	Optimize	#6	#10	#4	2	1.5	1.5	1.5	2	1	12

Deflection Design

	Label	LC	Ratio	LC	Ratio	LC	Ratio
1	Typical	1	240	2	360	3	240

Drift Definitions

No Data to Print...	

Node Loads and Enforced Displacements (BLC 4 : WIND)

	Node Label	L, D, M	Direction	Magnitude [(k, k-ft), (in, rad), (k*s ² /ft, k*s ² *ft)]
1	R1	L	X	14.2
2	M1	L	X	8.1

Member Point Loads (BLC 1 : DEAD)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(ft, %)]
1	M6	y	-4.1	16.33

Member Point Loads (BLC 2 : ROOF LIVE)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(ft, %)]
1	M6	y	-4.1	16.33

Wall Panel Point Loads

No Data to Print...	

Diaphragm Point Loads

No Data to Print...	

Member Distributed Loads (BLC 1 : DEAD)

Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1 M6	Y	-0.125	-0.125	0	%100
2 M7	Y	-0.325	-0.325	0	%100
3 M8	Y	-0.325	-0.325	0	%100

Member Distributed Loads (BLC 2 : ROOF LIVE)

Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1 M6	Y	-0.125	-0.125	0	%100

Member Distributed Loads (BLC 3 : LIVE)

Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1 M7	Y	-0.5	-0.5	0	%100
2 M8	Y	-0.5	-0.5	0	%100

Wall Panel Distributed Loads

No Data to Print...

Diaphragm Distributed Loads

No Data to Print...

Member Area Loads

No Data to Print...

Plate Surface Loads

No Data to Print...

Wall Panel Surface Loads

No Data to Print...

Diaphragm Surface Loads

No Data to Print...

Basic Load Cases

BLC Description	Category	X Gravity	Nodal	Point	Distributed
1 DEAD	DL	-1		1	3
2 ROOF LIVE	RLL			1	1
3 LIVE	LL				2
4 WIND	WL		2		

Moving Loads

No Data to Print...

Moving Load Patterns

No Data to Print...

Time History Loads

No Data to Print...

Load Combinations

Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1 Deflection 1	Yes	Y	DL	1								
2 Deflection 2	Yes	Y	LL	1								
3 Deflection 3	Yes	Y	DL	1	LL	1						
4 IBC 16-1	Yes	Y	DL	1.4								
5 IBC 16-2 (a)	Yes	Y	DL	1.2	LL	1.6	LLS	1.6	RLL	0.5		
6 IBC 16-2 (b)	Yes	Y	DL	1.2	LL	1.6	LLS	1.6				
7 IBC 16-3 (a)	Yes	Y	DL	1.2	RLL	1.6	LL	0.5	LLS	1		
8 IBC 16-3 (b) (a)	Yes	Y	DL	1.2	RLL	1.6	WL	0.5				
9 IBC 16-3 (b) (b)	Yes	Y	DL	1.2	RLL	1.6	WL	-0.5				

Load Combinations (Continued)

Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
10 IBC 16-3 (d) (a)	Yes	Y	DL	1.2	WL	0.5						
11 IBC 16-3 (d) (b)	Yes	Y	DL	1.2	WL	-0.5						
12 IBC 16-4 (a) (a)	Yes	Y	DL	1.2	WL	1	LL	0.5	LLS	1	RLL	0.5
13 IBC 16-4 (a) (b)	Yes	Y	DL	1.2	WL	-1	LL	0.5	LLS	1	RLL	0.5
14 IBC 16-4 (b) (a)	Yes	Y	DL	1.2	WL	1	LL	0.5	LLS	1		
15 IBC 16-4 (b) (b)	Yes	Y	DL	1.2	WL	-1	LL	0.5	LLS	1		
16 IBC 16-6 (a)	Yes	Y	DL	0.9	WL	1						
17 IBC 16-6 (b)	Yes	Y	DL	0.9	WL	-1						
18 dead	Yes	Y	DL	1								
19 live	Yes	Y	LL	1								
20 Roof live	Yes	Y	RLL	1								
21 wind	Yes	Y	WL	1								

Load Combination Design

Description	Service	Hot Rolled	Cold Formed	Wood	Concrete	Masonry	Aluminum	Stainless	Connection
1 Deflection 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2 Deflection 2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3 Deflection 3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4 IBC 16-1		Yes	Yes		Yes	Yes	Yes	Yes	Yes
5 IBC 16-2 (a)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
6 IBC 16-2 (b)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
7 IBC 16-3 (a)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
8 IBC 16-3 (b) (a)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
9 IBC 16-3 (b) (b)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
10 IBC 16-3 (d) (a)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
11 IBC 16-3 (d) (b)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
12 IBC 16-4 (a) (a)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
13 IBC 16-4 (a) (b)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
14 IBC 16-4 (b) (a)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
15 IBC 16-4 (b) (b)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
16 IBC 16-6 (a)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
17 IBC 16-6 (b)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
18 dead	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
19 live	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
20 Roof live	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
21 wind	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Node Reactions

No Data to Print...

Node Reactions - Overstrength or Capacity Limit

No Data to Print...

Node Displacements

No Data to Print...

Member Section Forces

No Data to Print...

Maximum Member Section Forces

No Data to Print...

Member End Reactions

No Data to Print...

Member 2nd/1st Moment Ratios

No Data to Print...

Member Torsion Stresses

No Data to Print...



Company : J&S Structural Engineers
Designer : KEJ
Job Number : 24-021
Model Name : FRAME 6 LS JOC

11/1/2024
4:15:39 PM
Checked By : _____

Member Section Stresses

No Data to Print...

Member Section Deflections - Service

No Data to Print...

Member Section Deflections - Strength

No Data to Print...

Beam Deflections

No Data to Print...

Beam Deflection Checks

No Data to Print...

AISC 15TH (360-16): ASD Member Steel Code Checks

No Data to Print...

AISI S100-20: ASD Member Cold Formed Steel Code Checks

No Data to Print...

AWC NDS-18 / SDPWS-21 ASD Member Wood Code Checks

No Data to Print...

AA ADM1-20: ASD - BUILDING Member Aluminum Code Checks

No Data to Print...

AISC 14TH (360-10): ASD Member Stainless Steel Code Checks

No Data to Print...

Plate Principal Stresses

No Data to Print...

Plate Forces (per ft)

No Data to Print...

Plate Corner Forces

No Data to Print...

Solid Stresses

No Data to Print...

Solid Principal Stresses

No Data to Print...

Solid Corner Forces

No Data to Print...

Wall Panel Forces

No Data to Print...

TMS 402-16: ASD Wall Panel Masonry Code Checks (Seismic)

No Data to Print...

X-Direction Story Drift - Service

No Data to Print...

Z-Direction Story Drift - Service

No Data to Print...

X-Direction Story Drift - Strength

No Data to Print...

Z-Direction Story Drift - Strength

No Data to Print...

Envelope Node Reactions

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
0	F1	max	0.149	4	32.381	13	0	21	0	21	0	21	0	21
1		min	-0.021	21	-22.143	21	0	1	0	1	0	1	0	1
2	R3	max	0	21	0	21	0	21	0	21	0	21	0	21
3		min	0	1	0	1	0	1	0	1	0	1	0	1
4	R1	max	0	21	0	21	0	21	0	21	0	21	0	21
5		min	0	1	0	1	0	1	0	1	0	1	0	1
6	M1	max	0	21	0	21	0	21	0	21	0	21	0	21
7		min	0	1	0	1	0	1	0	1	0	1	0	1
8	M3	max	0	21	0	21	0	21	0	21	0	21	0	21
9		min	0	1	0	1	0	1	0	1	0	1	0	1
10	M2	max	0	21	0	21	0	21	0	21	0	21	0	21
11		min	0	1	0	1	0	1	0	1	0	1	0	1
12	F2	max	28.426	13	23.049	5	0	21	0	21	0	21	0	21
13		min	-22.294	21	-0.316	21	0	1	0	1	0	1	0	1
14	F3	max	0.15	4	27.346	12	0	21	0	21	0	21	0	21
15		min	0	2	-21.217	17	0	1	0	1	0	1	0	1
16	Totals:	max	28.672	13	43.323	5	0	21						
17		min	-22.3	21	0	21	0	1						

Envelope Node Displacements

Node Label		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
0	F1	max	0	21	0	21	0	21	0	21	0	1.216e-3	13
1		min	0	4	0	13	0	1	0	1	0	-5.649e-4	21
2	F2	max	0	21	0	21	0	21	0	21	0	1.757e-3	15
3		min	0	13	0	5	0	1	0	1	0	-5.155e-4	21
4	F3	max	0	19	0	17	0	21	0	21	0	1.134e-3	15
5		min	0	4	0	12	0	1	0	1	0	-5.177e-4	21
6	M1	max	0.098	21	0.033	21	0	21	0	21	0	6.541e-4	15
7		min	-0.119	13	-0.049	13	0	1	0	1	0	-4.643e-4	21
8	M2	max	0.095	21	0	20	0	21	0	21	0	-4.171e-6	20
9		min	-0.115	15	-0.023	5	0	1	0	1	0	-1.543e-3	12
10	M3	max	0.091	21	0.032	17	0	21	0	21	0	6.324e-4	15
11		min	-0.108	15	-0.041	12	0	1	0	1	0	-4.456e-4	21
12	R1	max	0.176	21	0.042	21	0	21	0	21	0	-1.07e-5	19
13		min	-0.206	15	-0.067	13	0	1	0	1	0	-1.123e-3	12
14	R3	max	0.17	21	0.033	17	0	21	0	21	0	-2.503e-6	19
15		min	-0.199	15	-0.057	12	0	1	0	1	0	-1.1e-3	12
16	N11	max	0.131	21	0.001	21	0	21	0	21	0	3.554e-4	13
17		min	-0.156	15	-0.026	7	0	1	0	1	0	-2.979e-4	21

Envelope Member Section Forces

Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
0	M1	1	max	32.381	13	0.003	21	0	21	0	0	21	0	21
1			min	-22.143	21	-0.152	4	0	1	0	0	1	0	1
2		2	max	32.381	13	0.003	21	0	21	0	0	21	0.383	4
3			min	-22.143	21	-0.048	4	0	1	0	0	1	-0.01	21
4		3	max	32.381	13	0.055	4	0	21	0	0	21	0.37	4
5			min	-22.143	21	0	20	0	1	0	0	1	-0.02	21
6		4	max	32.381	13	0.158	4	0	21	0	0	21	0.006	17
7			min	-22.143	21	0	20	0	1	0	0	1	-0.062	14
8		5	max	32.381	13	0.262	4	0	21	0	0	21	0.004	20
9			min	-22.143	21	0	20	0	1	0	0	1	-0.842	4
10	M2	1	max	11.246	9	0	20	0	21	0	0	21	0.004	20
11			min	-5.446	21	-0.275	4	0	1	0	0	1	-0.842	4
12		2	max	11.246	9	0	20	0	21	0	0	21	0.093	13

Envelope Member Section Forces (Continued)

Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC	
13		min	-5.446	21	-0.163	4	0	1	0	1	0	1	-0.03	21	
14	3	max	11.246	9	0	20	0	21	0	21	0	21	0.515	4	
15		min	-5.446	21	-0.051	4	0	1	0	1	0	1	-0.02	21	
16	4	max	11.246	9	0.062	4	0	21	0	21	0	21	0.491	4	
17		min	-5.446	21	-0.002	21	0	1	0	1	0	1	-0.01	21	
18	5	max	11.246	9	0.174	4	0	21	0	21	0	21	0	21	
19		min	-5.446	21	-0.002	21	0	1	0	1	0	1	0	1	
20	M3	1	max	15.422	5	0	21	0	21	0	21	0	21	0	21
21		min	0	20	-0.207	4	0	1	0	1	0	1	0	1	
22	2	max	15.422	5	0	21	0	21	0	21	0	21	0.594	4	
23		min	0	20	-0.103	4	0	1	0	1	0	1	0	2	
24	3	max	15.422	5	0	21	0	21	0	21	0	21	0.792	4	
25		min	0	20	0	1	0	1	0	1	0	1	0	2	
26	4	max	15.422	5	0.103	4	0	21	0	21	0	21	0.594	4	
27		min	0	20	0	2	0	1	0	1	0	1	0	2	
28	5	max	15.422	5	0.207	4	0	21	0	21	0	21	0	21	
29		min	0	20	0	2	0	1	0	1	0	1	0	1	
30	M4	1	max	27.346	12	0.002	21	0	21	0	21	0	21	0	21
31		min	-21.217	17	-0.151	4	0	1	0	1	0	1	0	1	
32	2	max	27.346	12	0.002	21	0	21	0	21	0	21	0.38	4	
33		min	-21.217	17	-0.048	4	0	1	0	1	0	1	-0.007	21	
34	3	max	27.346	12	0.056	4	0	21	0	21	0	21	0.364	4	
35		min	-21.217	17	0	2	0	1	0	1	0	1	-0.014	21	
36	4	max	27.346	12	0.159	4	0	21	0	21	0	21	-0.001	19	
37		min	-21.217	17	0	2	0	1	0	1	0	1	-0.063	12	
38	5	max	27.346	12	0.262	4	0	21	0	21	0	21	-0.001	19	
39		min	-21.217	17	0	2	0	1	0	1	0	1	-0.855	4	
40	M5	1	max	12.164	8	0	19	0	21	0	21	0	21	-0.001	19
41		min	-0.6	17	-0.276	4	0	1	0	1	0	1	-0.855	4	
42	2	max	12.164	8	0	19	0	21	0	21	0	21	0.073	15	
43		min	-0.6	17	-0.164	4	0	1	0	1	0	1	-0.022	21	
44	3	max	12.164	8	0	19	0	21	0	21	0	21	0.509	4	
45		min	-0.6	17	-0.051	4	0	1	0	1	0	1	-0.014	21	
46	4	max	12.164	8	0.061	4	0	21	0	21	0	21	0.488	4	
47		min	-0.6	17	-0.002	21	0	1	0	1	0	1	-0.007	21	
48	5	max	12.164	8	0.173	4	0	21	0	21	0	21	0	21	
49		min	-0.6	17	-0.002	21	0	1	0	1	0	1	0	1	
50	M6	1	max	5.937	14	8.783	9	0	21	0	21	0	21	0	21
51		min	-5.808	13	0	2	0	1	0	1	0	1	0	1	
52	2	max	5.743	21	6.515	9	0	21	0	21	0	21	0	21	
53		min	-6.12	13	0	2	0	1	0	1	0	1	-49.568	7	
54	3	max	5.743	21	4.247	9	0	21	0	21	0	21	0	21	
55		min	-6.432	13	0	2	0	1	0	1	0	1	-84.44	7	
56	4	max	5.743	21	0	21	0	21	0	21	0	21	0	21	
57		min	-6.744	13	-9.501	7	0	1	0	1	0	1	-68.912	7	
58	5	max	5.743	21	0	21	0	21	0	21	0	21	0	21	
59		min	-7.057	13	-11.769	7	0	1	0	1	0	1	0	1	
60	M7	1	max	4.579	21	6.497	6	0	21	0	21	0	21	0	21
61		min	-7.509	13	0	20	0	1	0	1	0	1	0	1	
62	2	max	4.579	21	3.249	6	0	21	0	21	0	21	0	21	
63		min	-7.608	13	0	20	0	1	0	1	0	1	-13.303	5	
64	3	max	4.579	21	0	21	0	21	0	21	0	21	0	21	
65		min	-7.707	13	0	1	0	1	0	1	0	1	-17.738	5	
66	4	max	4.579	21	0	21	0	21	0	21	0	21	0	21	
67		min	-7.805	13	-3.249	5	0	1	0	1	0	1	-13.303	5	
68	5	max	4.579	21	0	21	0	21	0	21	0	21	0	21	
69		min	-7.904	13	-6.497	5	0	1	0	1	0	1	0	1	
70	M8	1	max	4.579	21	8.925	6	0	21	0	21	0	21	0	21
71		min	-8.089	13	0	20	0	1	0	1	0	1	0	1	
72	2	max	4.579	21	4.463	6	0	21	0	21	0	21	0	21	
73		min	-8.225	13	0	20	0	1	0	1	0	1	-25.102	5	
74	3	max	4.579	21	0	21	0	21	0	21	0	21	0	21	
75		min	-8.36	13	0	1	0	1	0	1	0	1	-33.469	5	
76	4	max	4.579	21	0	21	0	21	0	21	0	21	0	21	
77		min	-8.496	13	-4.463	5	0	1	0	1	0	1	-25.102	5	
78	5	max	4.579	21	0	21	0	21	0	21	0	21	0	21	
79		min	-8.631	13	-8.925	5	0	1	0	1	0	1	0	1	
80	M9	1	max	10.056	21	0.085	4	0	21	0	21	0	21	0	21

Envelope Member Section Forces (Continued)

Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
81		min	-10.519	15	0	2	0	1	0	1	0	1	0	1
82	2	max	10.056	21	0.029	4	0	21	0	21	0	21	0	19
83		min	-10.594	15	0	2	0	1	0	1	0	1	-0.218	4
84	3	max	10.056	21	0.001	21	0	21	0	21	0	21	-0.001	19
85		min	-10.668	15	-0.028	4	0	1	0	1	0	1	-0.22	4
86	4	max	10.056	21	0.001	21	0	21	0	21	0	21	0.007	17
87		min	-10.743	15	-0.084	4	0	1	0	1	0	1	-0.017	12
88	5	max	10.056	21	0.001	21	0	21	0	21	0	21	0.426	4
89		min	-10.818	15	-0.14	4	0	1	0	1	0	1	-0.014	21
90	M10	1	max	16.146	12	0.207	4	0	21	0	21	0	21	0
91		min	-16.818	17	0	2	0	1	0	1	0	1	0	1
92	2	max	16.083	12	0.103	4	0	21	0	21	0	21	0	21
93		min	-16.865	17	0	2	0	1	0	1	0	1	-0.729	4
94	3	max	16.02	12	0	21	0	21	0	21	0	21	0	21
95		min	-16.913	17	0	1	0	1	0	1	0	1	-0.972	4
96	4	max	15.957	12	0	21	0	21	0	21	0	21	0	21
97		min	-16.96	17	-0.103	4	0	1	0	1	0	1	-0.729	4
98	5	max	15.956	21	0	21	0	21	0	21	0	21	0	21
99		min	-17.007	17	-0.207	4	0	1	0	1	0	1	0	1
100	M11	1	max	26.694	13	0	21	0	21	0	21	0	21	0
101		min	-18.644	21	-0.207	4	0	1	0	1	0	1	0	1
102	2	max	26.607	13	0	21	0	21	0	21	0	21	0.831	4
103		min	-18.644	21	-0.103	4	0	1	0	1	0	1	0	2
104	3	max	26.521	13	0	21	0	21	0	21	0	21	1.108	4
105		min	-18.644	21	0	1	0	1	0	1	0	1	0	2
106	4	max	26.434	13	0.103	4	0	21	0	21	0	21	0.831	4
107		min	-18.644	21	0	2	0	1	0	1	0	1	0	2
108	5	max	26.347	13	0.207	4	0	21	0	21	0	21	0	21
109		min	-18.644	21	0	2	0	1	0	1	0	1	0	1
110	M12	1	max	10.056	21	0.14	4	0	21	0	21	0	21	0.426
111		min	-10.919	15	-0.001	21	0	1	0	1	0	1	-0.014	21
112	2	max	10.056	21	0.084	4	0	21	0	21	0	21	0.007	17
113		min	-10.994	15	-0.001	21	0	1	0	1	0	1	-0.017	12
114	3	max	10.056	21	0.028	4	0	21	0	21	0	21	-0.001	19
115		min	-11.068	15	-0.001	21	0	1	0	1	0	1	-0.22	4
116	4	max	10.056	21	0	19	0	21	0	21	0	21	0	19
117		min	-11.143	15	-0.029	4	0	1	0	1	0	1	-0.218	4
118	5	max	10.056	21	0	19	0	21	0	21	0	21	0	21
119		min	-11.218	15	-0.085	4	0	1	0	1	0	1	0	1
120	M13	1	max	9.412	13	0	21	0	21	0	21	0	21	0
121		min	-6.832	21	-0.112	4	0	1	0	1	0	1	0	1
122	2	max	9.337	13	0	21	0	21	0	21	0	21	0.324	4
123		min	-6.832	21	-0.056	4	0	1	0	1	0	1	0	2
124	3	max	9.262	13	0	21	0	21	0	21	0	21	0.433	4
125		min	-6.832	21	0	1	0	1	0	1	0	1	0	2
126	4	max	9.187	13	0.056	4	0	21	0	21	0	21	0.324	4
127		min	-6.832	21	0	2	0	1	0	1	0	1	0	2
128	5	max	9.113	13	0.112	4	0	21	0	21	0	21	0	21
129		min	-6.832	21	0	2	0	1	0	1	0	1	0	1
130	M14	1	max	8.935	13	0	21	0	21	0	21	0	21	0
131		min	-6.831	21	-0.112	4	0	1	0	1	0	1	0	1
132	2	max	8.86	13	0	21	0	21	0	21	0	21	0.324	4
133		min	-6.831	21	-0.056	4	0	1	0	1	0	1	0	2
134	3	max	8.785	13	0	21	0	21	0	21	0	21	0.433	4
135		min	-6.831	21	0	1	0	1	0	1	0	1	0	2
136	4	max	8.71	13	0.056	4	0	21	0	21	0	21	0.324	4
137		min	-6.831	21	0	2	0	1	0	1	0	1	0	2
138	5	max	8.635	13	0.112	4	0	21	0	21	0	21	0	21
139		min	-6.831	21	0	2	0	1	0	1	0	1	0	1

Envelope Maximum Member Section Forces

Member		Axial[k]	Loc[ft]	LC	y Shear[k]	Loc[ft]	LC	z Shear[k]	Loc[ft]	LC	Torque[k-ft]	Loc[ft]	LC	y-y Moment[k-ft]	Loc[ft]	LC	z-z Moment[k-ft]	Loc[ft]	LC	
0	M1	max	32.381	15.33	13	0.262	15.33	4	0	15.33	21	0	15.33	21	0	15.33	21	0.426	5.589	4
1		min	-22.143	0	21	-0.152	0	4	0	0	1	0	0	1	0	0	1	-0.842	15.33	4
2	M2	max	11.246	16.67	9	0.174	16.67	4	0	16.67	21	0	16.67	21	0	16.67	21	0.562	10.245	4
3		min	-5.446	0	21	-0.275	0	4	0	0	1	0	0	1	0	0	1	-0.842	0	4
4	M3	max	15.422	15.33	5	0.207	15.33	4	0	15.33	21	0	15.33	21	0	15.33	21	0.792	7.665	4
5		min	0	0	20	-0.207	0	4	0	0	1	0	0	1	0	0	1	0	0	1

Envelope Maximum Member Section Forces (Continued)

Member		Axial[k]	Loc[ft]	LC	y Shear[k]	Loc[ft]	LC	z Shear[k]	Loc[ft]	LC	Torque[k-ft]	Loc[ft]	LC	y-y Moment[k-ft]	Loc[ft]	LC	z-z Moment[k-ft]	Loc[ft]	LC
6	M4	max	27.346	15.33	12	0.262	15.33	4	0	0	15.33	21	0	15.33	21	0	0.422	5.589	4
7		min	-21.217	0	17	-0.151	0	4	0	0	0	1	0	0	1	0	-0.855	15.33	4
8	M5	max	12.164	16.67	8	0.173	16.67	4	0	0	16.67	21	0	16.67	21	0	0.557	10.245	4
9		min	-0.6	0	17	-0.276	0	4	0	0	0	1	0	0	1	0	-0.855	0	4
10	M6	max	5.937	0	14	8.783	0	9	0	0	25.92	21	0	25.92	21	0	0	25.92	21
11		min	-7.057	25.92	13	-11.769	25.92	7	0	0	0	1	0	0	1	0	-96.364	16.2	7
12	M7	max	4.579	10.92	21	6.497	0	6	0	0	10.92	21	0	10.92	21	0	0	10.92	21
13		min	-7.904	10.92	13	-6.497	10.92	5	0	0	0	1	0	0	1	0	-17.738	5.46	5
14	M8	max	4.579	15	21	8.925	0	6	0	0	15	21	0	15	21	0	0	15	21
15		min	-8.631	15	13	-8.925	15	5	0	0	0	1	0	0	1	0	-33.469	7.5	5
16	M9	max	10.056	15.409	21	0.085	0	4	0	0	15.409	21	0	15.409	21	0	0.426	15.409	4
17		min	-10.818	15.409	15	-0.14	15.409	4	0	0	0	1	0	0	1	0	-0.246	5.778	4
18	M10	max	16.146	0	12	0.207	0	4	0	0	18.822	21	0	18.822	21	0	0	18.822	21
19		min	-17.007	18.822	17	-0.207	18.822	4	0	0	0	1	0	0	1	0	-0.972	9.411	4
20	M11	max	26.694	0	13	0.207	21.448	4	0	0	21.448	21	0	21.448	21	0	1.108	10.724	4
21		min	-18.644	0	21	-0.207	0	4	0	0	0	1	0	0	1	0	0	0	1
22	M12	max	10.056	15.409	21	0.14	0	4	0	0	15.409	21	0	15.409	21	0	0.426	0	4
23		min	-11.218	15.409	15	-0.085	15.409	4	0	0	0	1	0	0	1	0	-0.246	9.631	4
24	M13	max	9.412	0	13	0.112	15.409	4	0	0	15.409	21	0	15.409	21	0	0.433	7.704	4
25		min	-6.832	0	21	-0.112	0	4	0	0	0	1	0	0	1	0	0	0	1
26	M14	max	8.935	0	13	0.112	15.409	4	0	0	15.409	21	0	15.409	21	0	0.433	7.704	4
27		min	-6.831	0	21	-0.112	0	4	0	0	0	1	0	0	1	0	0	0	1

Envelope Member End Reactions

Member	Member End		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
0	M1	I	max	32.381	13	0.003	21	0	21	0	21	0	21	0
1		min	-22.143	21	-0.152	4	0	1	0	1	0	1	0	1
2	J	max	32.381	13	0.262	4	0	21	0	21	0	21	0.004	20
3		min	-22.143	21	0	20	0	1	0	1	0	1	-0.842	4
4	M2	I	max	11.246	9	0	20	0	21	0	21	0	21	0.004
5		min	-5.446	21	-0.275	4	0	1	0	1	0	1	-0.842	4
6	J	max	11.246	9	0.174	4	0	21	0	21	0	21	0	21
7		min	-5.446	21	-0.002	21	0	1	0	1	0	1	0	1
8	M3	I	max	15.422	5	0	21	0	21	0	21	0	21	0
9		min	0	20	-0.207	4	0	1	0	1	0	1	0	1
10	J	max	15.422	5	0.207	4	0	21	0	21	0	21	0	21
11		min	0	20	0	2	0	1	0	1	0	1	0	1
12	M4	I	max	27.346	12	0.002	21	0	21	0	21	0	21	0
13		min	-21.217	17	-0.151	4	0	1	0	1	0	1	0	1
14	J	max	27.346	12	0.262	4	0	21	0	21	0	21	-0.001	19
15		min	-21.217	17	0	2	0	1	0	1	0	1	-0.855	4
16	M5	I	max	12.164	8	0	19	0	21	0	21	0	21	-0.001
17		min	-0.6	17	-0.276	4	0	1	0	1	0	1	-0.855	4
18	J	max	12.164	8	0.173	4	0	21	0	21	0	21	0	21
19		min	-0.6	17	-0.002	21	0	1	0	1	0	1	0	1
20	M6	I	max	5.937	14	8.783	9	0	21	0	21	0	21	0
21		min	-5.808	13	0	2	0	1	0	1	0	1	0	1
22	J	max	5.743	21	0	21	0	21	0	21	0	21	0	21
23		min	-7.057	13	-11.769	7	0	1	0	1	0	1	0	1
24	M7	I	max	4.579	21	6.497	6	0	21	0	21	0	21	0
25		min	-7.509	13	0	20	0	1	0	1	0	1	0	1
26	J	max	4.579	21	0	21	0	21	0	21	0	21	0	21
27		min	-7.904	13	-6.497	5	0	1	0	1	0	1	0	1
28	M8	I	max	4.579	21	8.925	6	0	21	0	21	0	21	0
29		min	-8.089	13	0	20	0	1	0	1	0	1	0	1
30	J	max	4.579	21	0	21	0	21	0	21	0	21	0	21
31		min	-8.631	13	-8.925	5	0	1	0	1	0	1	0	1
32	M9	I	max	10.056	21	0.085	4	0	21	0	21	0	21	0
33		min	-10.519	15	0	2	0	1	0	1	0	1	0	1
34	J	max	10.056	21	0.001	21	0	21	0	21	0	21	0.426	4
35		min	-10.818	15	-0.14	4	0	1	0	1	0	1	-0.014	21
36	M10	I	max	16.146	12	0.207	4	0	21	0	21	0	21	0
37		min	-16.818	17	0	2	0	1	0	1	0	1	0	1
38	J	max	15.956	21	0	21	0	21	0	21	0	21	0	21
39		min	-17.007	17	-0.207	4	0	1	0	1	0	1	0	1
40	M11	I	max	26.694	13	0	21	0	21	0	21	0	21	0
41		min	-18.644	21	-0.207	4	0	1	0	1	0	1	0	1
42	J	max	26.347	13	0.207	4	0	21	0	21	0	21	0	21

Envelope Member End Reactions (Continued)

Member	Member End	Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
43		min	-18.644	21	0	2	0	1	0	1	0	1	0
44	M12	I	max	10.056	21	0.14	4	0	21	0	21	0	4
45		min	-10.919	15	-0.001	21	0	1	0	1	0	1	-0.014
46		J	max	10.056	21	0	19	0	21	0	21	0	21
47		min	-11.218	15	-0.085	4	0	1	0	1	0	1	0
48	M13	I	max	9.412	13	0	21	0	21	0	21	0	21
49		min	-6.832	21	-0.112	4	0	1	0	1	0	1	0
50		J	max	9.113	13	0.112	4	0	21	0	21	0	21
51		min	-6.832	21	0	2	0	1	0	1	0	1	0
52	M14	I	max	8.935	13	0	21	0	21	0	21	0	21
53		min	-6.831	21	-0.112	4	0	1	0	1	0	1	0
54		J	max	8.635	13	0.112	4	0	21	0	21	0	21
55		min	-6.831	21	0	2	0	1	0	1	0	1	0

Envelope Member 2nd/1st Moment Ratios

	Member		y-y Moment [k-ft]	2nd/1st Ratio	z-z Moment [k-ft]	2nd/1st Ratio	Loc [ft]	LC
0	M1	max	NC	NC	0.004	1	15.33	20
1		min	NC	NC	-0.04	1	15.33	21
2	M2	max	NC	NC	0.004	1	0	20
3		min	NC	NC	-0.04	1	0	21
4	M3	max	NC	NC	0.679	1	7.665	11
5		min	NC	NC	0.565	1	7.665	3
6	M4	max	NC	NC	-0.001	1	15.33	19
7		min	NC	NC	-0.705	1	15.33	13
8	M5	max	NC	NC	-0.001	1	0	19
9		min	NC	NC	-0.705	1	0	13
10	M6	max	NC	NC	-30.974	1	16.2	17
11		min	NC	NC	-41.299	1	16.2	6
12	M7	max	NC	NC	-5.813	1	5.46	11
13		min	NC	NC	-4.36	1	5.46	16
14	M8	max	NC	NC	-8.227	1	7.5	17
15		min	NC	NC	-12.797	1	7.5	4
16	M9	max	NC	NC	-0.014	1.002	15.409	21
17		min	NC	NC	0.287	1	15.409	17
18	M10	max	NC	NC	-0.833	1	9.411	12
19		min	NC	NC	-0.833	1	9.411	9
20	M11	max	NC	NC	0.712	1	10.724	16
21		min	NC	NC	0.949	1	10.724	12
22	M12	max	NC	NC	-0.014	1.002	0	21
23		min	NC	NC	0.287	1	0	17
24	M13	max	NC	NC	0.278	1	7.704	17
25		min	NC	NC	0.371	1	7.704	11
26	M14	max	NC	NC	0.278	1	7.704	16
27		min	NC	NC	0.371	1	7.704	9

Envelope Member Section Stresses

Member	Sec	Axial[ksi]	LC	y Shear[ksi]	LC	z Shear[ksi]	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
0	M1	1	max	6.156	13	0.001	21	0	21	0	21	0	21	0	21
1		min	-4.21	21	-0.063	4	0	1	0	1	0	1	0	1	0
2		2	max	6.156	13	0.001	21	0	21	0.016	21	0.605	4	0	21
3		min	-4.21	21	-0.02	4	0	1	-0.605	4	-0.016	21	0	1	0
4		3	max	6.156	13	0.023	4	0	21	0.032	21	0.585	4	0	21
5		min	-4.21	21	0	20	0	1	-0.585	4	-0.032	21	0	1	0
6		4	max	6.156	13	0.066	4	0	21	0.098	14	0.009	17	0	21
7		min	-4.21	21	0	20	0	1	-0.009	17	-0.098	14	0	1	0
8		5	max	6.156	13	0.109	4	0	21	1.33	4	0.006	20	0	21
9		min	-4.21	21	0	20	0	1	-0.006	20	-1.33	4	0	1	0
10	M2	1	max	2.138	9	0	20	0	21	1.33	4	0.006	20	0	21
11		min	-1.035	21	-0.115	4	0	1	-0.006	20	-1.33	4	0	1	0
12		2	max	2.138	9	0	20	0	21	0.048	21	0.146	13	0	21
13		min	-1.035	21	-0.068	4	0	1	-0.146	13	-0.048	21	0	1	0
14		3	max	2.138	9	0	20	0	21	0.032	21	0.813	4	0	21
15		min	-1.035	21	-0.021	4	0	1	-0.813	4	-0.032	21	0	1	0
16		4	max	2.138	9	0.026	4	0	21	0.016	21	0.776	4	0	21
17		min	-1.035	21	-0.001	21	0	1	-0.776	4	-0.016	21	0	1	0
18		5	max	2.138	9	0.072	4	0	21	0	21	0	21	0	21

Envelope Member Section Stresses (Continued)

Member	Sec		Axial[ksi]	LC	y Shear[ksi]	LC	z Shear[ksi]	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
19		min	-1.035	21	-0.001	21	0	1	0	1	0	1	0	1	0	1
20	M3	1 max	2.932	5	0	21	0	21	0	21	0	21	0	21	0	21
21		min	0	20	-0.086	4	0	1	0	1	0	1	0	1	0	1
22		2 max	2.932	5	0	21	0	21	0	21	0.938	4	0	21	0	21
23		min	0	20	-0.043	4	0	1	-0.938	4	0	2	0	1	0	1
24		3 max	2.932	5	0	21	0	21	0	21	1.25	4	0	21	0	21
25		min	0	20	0	1	0	1	-1.25	4	0	2	0	1	0	1
26		4 max	2.932	5	0.043	4	0	21	0	21	0.938	4	0	21	0	21
27		min	0	20	0	2	0	1	-0.938	4	0	2	0	1	0	1
28		5 max	2.932	5	0.086	4	0	21	0	21	0	21	0	21	0	21
29		min	0	20	0	2	0	1	0	1	0	1	0	1	0	1
30	M4	1 max	5.199	12	0.001	21	0	21	0	21	0	21	0	21	0	21
31		min	-4.034	17	-0.063	4	0	1	0	1	0	1	0	1	0	1
32		2 max	5.199	12	0.001	21	0	21	0.011	21	0.6	4	0	21	0	21
33		min	-4.034	17	-0.02	4	0	1	-0.6	4	-0.011	21	0	1	0	1
34		3 max	5.199	12	0.023	4	0	21	0.023	21	0.575	4	0	21	0	21
35		min	-4.034	17	0	2	0	1	-0.575	4	-0.023	21	0	1	0	1
36		4 max	5.199	12	0.066	4	0	21	0.1	12	-0.001	19	0	21	0	21
37		min	-4.034	17	0	2	0	1	0.001	2	-0.1	12	0	1	0	1
38		5 max	5.199	12	0.109	4	0	21	1.35	4	-0.002	19	0	21	0	21
39		min	-4.034	17	0	2	0	1	0.002	2	-1.35	4	0	1	0	1
40	M5	1 max	2.312	8	0	19	0	21	1.35	4	-0.002	19	0	21	0	21
41		min	-0.114	17	-0.115	4	0	1	0.002	2	-1.35	4	0	1	0	1
42		2 max	2.312	8	0	19	0	21	0.034	21	0.116	15	0	21	0	21
43		min	-0.114	17	-0.068	4	0	1	-0.116	15	-0.034	21	0	1	0	1
44		3 max	2.312	8	0	19	0	21	0.023	21	0.803	4	0	21	0	21
45		min	-0.114	17	-0.021	4	0	1	-0.803	4	-0.023	21	0	1	0	1
46		4 max	2.312	8	0.025	4	0	21	0.011	21	0.771	4	0	21	0	21
47		min	-0.114	17	-0.001	21	0	1	-0.771	4	-0.011	21	0	1	0	1
48		5 max	2.312	8	0.072	4	0	21	0	21	0	21	0	21	0	21
49		min	-0.114	17	-0.001	21	0	1	0	1	0	1	0	1	0	1
50	M6	1 max	0.503	14	1.558	9	0	21	0	21	0	21	0	21	0	21
51		min	-0.492	13	0	2	0	1	0	1	0	1	0	1	0	1
52		2 max	0.487	21	1.156	9	0	21	8.699	9	0	21	0	21	0	21
53		min	-0.519	13	0	2	0	1	0	2	-8.699	7	0	1	0	1
54		3 max	0.487	21	0.753	9	0	21	14.818	9	0	21	0	21	0	21
55		min	-0.545	13	0	2	0	1	0	2	-14.818	7	0	1	0	1
56		4 max	0.487	21	0	21	0	21	12.093	9	0	21	0	21	0	21
57		min	-0.572	13	-1.685	7	0	1	0	2	-12.093	7	0	1	0	1
58		5 max	0.487	21	0	21	0	21	0	21	0	21	0	21	0	21
59		min	-0.598	13	-2.087	7	0	1	0	1	0	1	0	1	0	1
60	M7	1 max	0.517	21	1.744	6	0	21	0	21	0	21	0	21	0	21
61		min	-0.849	13	0	20	0	1	0	1	0	1	0	1	0	1
62		2 max	0.517	21	0.872	6	0	21	3.785	6	0	21	0	21	0	21
63		min	-0.86	13	0	20	0	1	0	20	-3.785	5	0	1	0	1
64		3 max	0.517	21	0	21	0	21	5.047	6	0	21	0	21	0	21
65		min	-0.871	13	0	1	0	1	0	20	-5.047	5	0	1	0	1
66		4 max	0.517	21	0	21	0	21	3.785	6	0	21	0	21	0	21
67		min	-0.882	13	-0.872	5	0	1	0	20	-3.785	5	0	1	0	1
68		5 max	0.517	21	0	21	0	21	0	21	0	21	0	21	0	21
69		min	-0.893	13	-1.744	5	0	1	0	1	0	1	0	1	0	1
70	M8	1 max	0.517	21	2.395	6	0	21	0	21	0	21	0	21	0	21
71		min	-0.914	13	0	20	0	1	0	1	0	1	0	1	0	1
72		2 max	0.517	21	1.198	6	0	21	7.142	6	0	21	0	21	0	21
73		min	-0.929	13	0	20	0	1	0	20	-7.142	5	0	1	0	1
74		3 max	0.517	21	0	21	0	21	9.523	6	0	21	0	21	0	21
75		min	-0.945	13	0	1	0	1	0	20	-9.523	5	0	1	0	1
76		4 max	0.517	21	0	21	0	21	7.142	6	0	21	0	21	0	21
77		min	-0.96	13	-1.198	5	0	1	0	20	-7.142	5	0	1	0	1
78		5 max	0.517	21	0	21	0	21	0	21	0	21	0	21	0	21
79		min	-0.975	13	-2.395	5	0	1	0	1	0	1	0	1	0	1
80	M9	1 max	1.912	21	0.035	4	0	21	0	21	0	21	0	21	0	21
81		min	-2	15	0	2	0	1	0	1	0	1	0	1	0	1
82		2 max	1.912	21	0.012	4	0	21	0.344	4	-0.001	19	0	21	0	21
83		min	-2.014	15	0	2	0	1	0.001	2	-0.344	4	0	1	0	1
84		3 max	1.912	21	0	21	0	21	0.347	4	-0.001	19	0	21	0	21
85		min	-2.028	15	-0.012	4	0	1	0.001	2	-0.347	4	0	1	0	1
86		4 max	1.912	21	0	21	0	21	0.026	12	0.011	17	0	21	0	21

Envelope Member Section Stresses (Continued)

Member	Sec		Axial[ksi]	LC	y Shear[ksi]	LC	z Shear[ksi]	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
87		min	-2.042	15	-0.035	4	0	1	-0.011	17	-0.026	12	0	1	0	1
88	5	max	1.912	21	0	21	0	21	0.022	21	0.672	4	0	21	0	21
89		min	-2.057	15	-0.058	4	0	1	-0.672	4	-0.022	21	0	1	0	1
90	M10	1	max	3.07	12	0.086	4	0	21	0	21	0	21	0	21	0
91		min	-3.197	17	0	2	0	1	0	1	0	1	0	1	0	1
92	2	max	3.058	12	0.043	4	0	21	1.151	4	0	21	0	21	0	21
93		min	-3.206	17	0	2	0	1	0	2	-1.151	4	0	1	0	1
94	3	max	3.046	12	0	21	0	21	1.535	4	0	21	0	21	0	21
95		min	-3.215	17	0	1	0	1	0	2	-1.535	4	0	1	0	1
96	4	max	3.034	12	0	21	0	21	1.151	4	0	21	0	21	0	21
97		min	-3.224	17	-0.043	4	0	1	0	2	-1.151	4	0	1	0	1
98	5	max	3.033	21	0	21	0	21	0	21	0	21	0	21	0	21
99		min	-3.233	17	-0.086	4	0	1	0	1	0	1	0	1	0	1
100	M11	1	max	5.075	13	0	21	0	21	0	21	0	21	0	21	0
101		min	-3.544	21	-0.086	4	0	1	0	1	0	1	0	1	0	1
102	2	max	5.058	13	0	21	0	21	0	21	1.312	4	0	21	0	21
103		min	-3.544	21	-0.043	4	0	1	-1.312	4	0	2	0	1	0	1
104	3	max	5.042	13	0	21	0	21	0	21	1.749	4	0	21	0	21
105		min	-3.544	21	0	1	0	1	-1.749	4	0	2	0	1	0	1
106	4	max	5.025	13	0.043	4	0	21	0	21	1.312	4	0	21	0	21
107		min	-3.544	21	0	2	0	1	-1.312	4	0	2	0	1	0	1
108	5	max	5.009	13	0.086	4	0	21	0	21	0	21	0	21	0	21
109		min	-3.544	21	0	2	0	1	0	1	0	1	0	1	0	1
110	M12	1	max	1.912	21	0.058	4	0	21	0.022	21	0.672	4	0	21	0
111		min	-2.076	15	0	21	0	1	-0.672	4	-0.022	21	0	1	0	1
112	2	max	1.912	21	0.035	4	0	21	0.026	12	0.011	17	0	21	0	21
113		min	-2.09	15	0	21	0	1	-0.011	17	-0.026	12	0	1	0	1
114	3	max	1.912	21	0.012	4	0	21	0.347	4	-0.001	19	0	21	0	21
115		min	-2.104	15	0	21	0	1	0.001	2	-0.347	4	0	1	0	1
116	4	max	1.912	21	0	19	0	21	0.344	4	-0.001	19	0	21	0	21
117		min	-2.118	15	-0.012	4	0	1	0.001	2	-0.344	4	0	1	0	1
118	5	max	1.912	21	0	19	0	21	0	21	0	21	0	21	0	21
119		min	-2.133	15	-0.035	4	0	1	0	1	0	1	0	1	0	1
120	M13	1	max	1.789	13	0	21	0	21	0	21	0	21	0	21	0
121		min	-1.299	21	-0.047	4	0	1	0	1	0	1	0	1	0	1
122	2	max	1.775	13	0	21	0	21	0	21	0.512	4	0	21	0	21
123		min	-1.299	21	-0.023	4	0	1	-0.512	4	0	2	0	1	0	1
124	3	max	1.761	13	0	21	0	21	0	21	0.683	4	0	21	0	21
125		min	-1.299	21	0	1	0	1	-0.683	4	0	2	0	1	0	1
126	4	max	1.747	13	0.023	4	0	21	0	21	0.512	4	0	21	0	21
127		min	-1.299	21	0	2	0	1	-0.512	4	0	2	0	1	0	1
128	5	max	1.732	13	0.047	4	0	21	0	21	0	21	0	21	0	21
129		min	-1.299	21	0	2	0	1	0	1	0	1	0	1	0	1
130	M14	1	max	1.699	13	0	21	0	21	0	21	0	21	0	21	0
131		min	-1.299	21	-0.047	4	0	1	0	1	0	1	0	1	0	1
132	2	max	1.684	13	0	21	0	21	0	21	0.512	4	0	21	0	21
133		min	-1.299	21	-0.023	4	0	1	-0.512	4	0	2	0	1	0	1
134	3	max	1.67	13	0	21	0	21	0	21	0.683	4	0	21	0	21
135		min	-1.299	21	0	1	0	1	-0.683	4	0	2	0	1	0	1
136	4	max	1.656	13	0.023	4	0	21	0	21	0.512	4	0	21	0	21
137		min	-1.299	21	0	2	0	1	-0.512	4	0	2	0	1	0	1
138	5	max	1.642	13	0.047	4	0	21	0	21	0	21	0	21	0	21
139		min	-1.299	21	0	2	0	1	0	1	0	1	0	1	0	1

Envelope AISC 15TH (360-16): ASD Member Steel Code Checks

Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	Pnc/om [k]	Pnt/om [k]	Mnyy/om [k-ft]	Mnzz/om [k-ft]	Cb	Eqn	
0	M1	HSS5X5X5	0.448	15.33	13	0.007	15.33	y	4	77.149	144.886	21.026	21.026	2.084	H1-1a
1	M2	HSS5X5X5	0.164	16.67	9	0.007	0	y	4	68.769	144.886	21.026	21.026	1.712	H1-1b*
2	M3	HSS5X5X5	0.2	15.33	5	0.005	15.33	y	4	77.149	144.886	21.026	21.026	1.136	H1-1b*
3	M4	HSS5X5X5	0.387	15.33	12	0.007	15.33	y	4	77.149	144.886	21.026	21.026	2.249	H1-1a
4	M5	HSS5X5X5	0.177	16.67	8	0.007	0	y	4	68.769	144.886	21.026	21.026	1.893	H1-1b*
5	M6	W18X40	0.516	16.2	8	0.104	25.92	y	9	29.674	353.293	24.95	195.609	1	H1-1b
6	M7	W14X30	0.158	5.46	5	0.087	10.92	y	6	150.311	264.97	22.43	118.014	1	H1-1b
7	M8	W14X30	0.292	7.5	5	0.12	15	y	6	90.927	264.97	22.43	118.014	1	H1-1b
8	M9	HSS5X5X5	0.131	15.409	21	0.004	15.409	y	4	76.649	144.886	21.026	21.026	1.667	H1-1b*
9	M10	HSS5X5X5	0.321	9.019	12	0.005	18.822	y	4	55.983	144.886	21.026	21.026	1.136	H1-1a
10	M11	HSS5X5X5	0.655	10.277	13	0.005	21.448	y	4	43.113	144.886	21.026	21.026	1.136	H1-1a
11	M12	HSS5X5X5	0.131	15.409	21	0.004	0	y	4	76.649	144.886	21.026	21.026	1.667	H1-1b*

Envelope AISC 15TH (360-16): ASD Member Steel Code Checks (Continued)

Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	Pnc/om [k]	Pnt/om [k]	Mnyy/om [k-ft]	Mnzz/om [k-ft]	Cb	Eqn	
12	M13	HSS5X5X5	0.123	0	13	0.003	15.409	y	4	76.649	144.886	21.026	21.026	1.136	H1-1b*
13	M14	HSS5X5X5	0.117	0	13	0.003	15.409	y	4	76.649	144.886	21.026	21.026	1.136	H1-1b*

Envelope AISI S100-20: ASD Member Cold Formed Steel Code Checks

No Data to Print...

Envelope AWC NDS-18 / SDPWS-21 ASD Member Wood Code Checks

No Data to Print...

Envelope Concrete Beam Design Results

No Data to Print...

Envelope Concrete Column Design Results

No Data to Print...

Envelope AA ADM1-20: ASD - BUILDING Member Aluminum Code Checks

No Data to Print...

Envelope AISC 14TH (360-10): ASD Member Stainless Steel Code Checks

No Data to Print...

Frequencies and Participation

No Data to Print...

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e ⁵ F ⁻¹]	Density [k/ft ³]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A992	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	0.3	0.65	0.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	0.3	0.65	0.527	42	1.4	58	1.3
5	A500 Gr.B RECT	29000	11154	0.3	0.65	0.527	46	1.4	58	1.3
6	A500 Gr.C RND	29000	11154	0.3	0.65	0.527	46	1.4	62	1.3
7	A500 Gr.C RECT	29000	11154	0.3	0.65	0.527	50	1.4	62	1.3
8	A53 Gr.B	29000	11154	0.3	0.65	0.49	35	1.6	60	1.2
9	A1085	29000	11154	0.3	0.65	0.49	50	1.4	65	1.3
10	A913 Gr.65	29000	11154	0.3	0.65	0.49	65	1.1	80	1.1

Project Grid Lines

No Data to Print...

Project Grid Arcs

No Data to Print...

Node Coordinates

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
1	F1	0	0	0	
2	F3	15.67	0	0	
3	M1	0	15.33	0	
4	M3	15.67	15.33	0	
5	R1	0	32	0	
6	R3	15.67	32	0	
7	N8	7.835	23.665	0	
8	N10	7.835	7.665	0	

Node Boundary Conditions

	Node Label	X [k/in]	Y [k/in]	Z [k/in]
1	F1	Reaction	Reaction	Reaction
2	R3			Reaction
3	R1			Reaction
4	M1			Reaction
5	M3			Reaction
6	F3	Reaction	Reaction	Reaction

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in ²]	I _{yy} [in ⁴]	I _{zz} [in ⁴]	J [in ⁴]
1	HR1	W10X33	Beam	Wide Flange	A992	Typical	9.71	36.6	171	0.583

Member Primary Data

	Label	I Node	J Node	Section/Shape	Type	Design List	Material	Design Rule
1	M1	F1	M1	HSS8X8X6	Column	Tube	A500 Gr.B RECT	Typical
2	M2	M1	R1	HSS8X8X6	Column	Tube	A500 Gr.B RECT	Typical
3	M4	F3	M3	HSS8X8X6	Column	Tube	A500 Gr.B RECT	Typical
4	M5	M3	R3	HSS8X8X6	Column	Tube	A500 Gr.B RECT	Typical
5	M6	R1	R3	W14X30	Beam	Wide Flange	A992	Typical
6	M10	M1	M3	W16X36	Beam	Wide Flange	A992	Typical
7	M7	R1	N8	HSS5X5X5	VBrace	Tube	A500 Gr.B RECT	Typical
8	M8	M3	N10	HSS5X5X5	VBrace	Tube	A500 Gr.B RECT	Typical
9	M9	N8	M3	HSS5X5X5	VBrace	Tube	A500 Gr.B RECT	Typical
10	M11	N10	F1	HSS5X5X5	VBrace	Tube	A500 Gr.B RECT	Typical
11	M12	R3	N8	HSS5X5X5	VBrace	Tube	A500 Gr.B RECT	Typical
12	M13	N8	M1	HSS5X5X5	VBrace	Tube	A500 Gr.B RECT	Typical
13	M14	M1	N10	HSS5X5X5	VBrace	Tube	A500 Gr.B RECT	Typical
14	M15	N10	F3	HSS5X5X5	VBrace	Tube	A500 Gr.B RECT	Typical

Member Advanced Data

	Label	I Release	J Release	Physical	Deflection Ratio Options	Seismic DR
1	M1			Yes	** NA **	None
2	M2			Yes	** NA **	None
3	M4			Yes	** NA **	None
4	M5			Yes	** NA **	None
5	M6	BenPIN	BenPIN	Yes	Default	None
6	M10	BenPIN	BenPIN	Yes	Default	None
7	M7	BenPIN		Yes	** NA **	None
8	M8	BenPIN		Yes	** NA **	None
9	M9		BenPIN	Yes	** NA **	None
10	M11		BenPIN	Yes	** NA **	None
11	M12	BenPIN	BenPIN	Yes	** NA **	None
12	M13	BenPIN	BenPIN	Yes	** NA **	None
13	M14	BenPIN	BenPIN	Yes	** NA **	None
14	M15	BenPIN	BenPIN	Yes	** NA **	None

Hot Rolled Steel Design Parameters

	Label	Shape	Length [ft]	Lb z-z [ft]	Lcomp top [ft]	L-Torque [ft]	Channel Conn.	a [ft]	Function
1	M1	HSS8X8X6	15.33		Lbyy		N/A	N/A	Lateral
2	M2	HSS8X8X6	16.67		Lbyy		N/A	N/A	Lateral
3	M4	HSS8X8X6	15.33		Lbyy		N/A	N/A	Lateral
4	M5	HSS8X8X6	16.67		Lbyy		N/A	N/A	Lateral
5	M6	W14X30	15.67	1	1	1	N/A	N/A	Lateral
6	M10	W16X36	15.67		Lbyy		N/A	N/A	Lateral
7	M7	HSS5X5X5	11.439		Lbyy		N/A	N/A	Lateral
8	M8	HSS5X5X5	10.961		Lbyy		N/A	N/A	Lateral
9	M9	HSS5X5X5	11.439		Lbyy		N/A	N/A	Lateral
10	M11	HSS5X5X5	10.961		Lbyy		N/A	N/A	Lateral
11	M12	HSS5X5X5	11.439		Lbyy		N/A	N/A	Lateral
12	M13	HSS5X5X5	11.439		Lbyy		N/A	N/A	Lateral
13	M14	HSS5X5X5	10.961		Lbyy		N/A	N/A	Lateral
14	M15	HSS5X5X5	10.961		Lbyy		N/A	N/A	Lateral

Design Size and Code Check Parameters

	Label	Max Axial/Bending Chk	Max Shear Chk
1	Typical	1	1

Concrete Rebar Parameters

	Label	Optimize Rebar ?	Min Flex Bar	Max Flex Bar	Shear Bar	Legs per Stirrup	Top (Column) Cover [in]	Bottom Cover [in]	Side Cover [in]	Top/Bottom Bars	Add'l Side Bars	Shear Bar Spacing [in]
1	Typical	Optimize	#6	#10	#4	2	1.5	1.5	1.5	2	1	12

Deflection Design

	Label	LC	Ratio	LC	Ratio	LC	Ratio
1	Typical	1	240	2	360	3	240

Drift Definitions

No Data to Print...

Node Loads and Enforced Displacements (BLC 4 : WIND)

	Node Label	L, D, M	Direction	Magnitude [(k, k-ft), (in, rad), (k*s²/ft, k*s²*ft)]
1	R1	L	X	14.2
2	M1	L	X	8.1

Member Point Loads

No Data to Print...

Wall Panel Point Loads

No Data to Print...

Diaphragm Point Loads

No Data to Print...

Member Distributed Loads (BLC 1 : DEAD)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M6	Y	-0.725	-0.725	0	%100

Member Distributed Loads (BLC 2 : ROOF LIVE)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M6	Y	-0.725	-0.725	0	%100

Member Distributed Loads (BLC 3 : LIVE)

Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1 M10	Y	-0.5	-0.5	0	%100

Wall Panel Distributed Loads

No Data to Print...

Diaphragm Distributed Loads

No Data to Print...

Member Area Loads

No Data to Print...

Plate Surface Loads

No Data to Print...

Wall Panel Surface Loads

No Data to Print...

Diaphragm Surface Loads

No Data to Print...

Basic Load Cases

	BLC Description	Category	X Gravity	Nodal	Distributed
1	DEAD	DL	-1		1
2	ROOF LIVE	RLL			1
3	LIVE	LL			1
4	WIND	WL		2	

Moving Loads

No Data to Print...

Moving Load Patterns

No Data to Print...

Time History Loads

No Data to Print...

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	Deflection 1	Yes	Y	DL	1								
2	Deflection 2	Yes	Y	LL	1								
3	Deflection 3	Yes	Y	DL	1	LL	1						
4	IBC 16-1	Yes	Y	DL	1.4								
5	IBC 16-2 (a)	Yes	Y	DL	1.2	LL	1.6	LLS	1.6	RLL	0.5		
6	IBC 16-2 (b)	Yes	Y	DL	1.2	LL	1.6	LLS	1.6				
7	IBC 16-3 (a)	Yes	Y	DL	1.2	RLL	1.6	LL	0.5	LLS	1		
8	IBC 16-3 (b) (a)	Yes	Y	DL	1.2	RLL	1.6	WL	0.5				
9	IBC 16-3 (b) (b)	Yes	Y	DL	1.2	RLL	1.6	WL	-0.5				
10	IBC 16-3 (d) (a)	Yes	Y	DL	1.2	WL	0.5						
11	IBC 16-3 (d) (b)	Yes	Y	DL	1.2	WL	-0.5						
12	IBC 16-4 (a) (a)	Yes	Y	DL	1.2	WL	1	LL	0.5	LLS	1	RLL	0.5
13	IBC 16-4 (a) (b)	Yes	Y	DL	1.2	WL	-1	LL	0.5	LLS	1	RLL	0.5
14	IBC 16-4 (b) (a)	Yes	Y	DL	1.2	WL	1	LL	0.5	LLS	1		
15	IBC 16-4 (b) (b)	Yes	Y	DL	1.2	WL	-1	LL	0.5	LLS	1		
16	IBC 16-6 (a)	Yes	Y	DL	0.9	WL	1						
17	IBC 16-6 (b)	Yes	Y	DL	0.9	WL	-1						
18	DEAD	Yes	Y	DL	1								
19	LIVE	Yes	Y	LL	1								
20	ROOF LIVE	Yes	Y	RLL	1								
21	WIND	Yes	Y	WL	1								

Load Combination Design

	Description	Service	Hot Rolled	Cold Formed	Wood	Concrete	Masonry	Aluminum	Stainless	Connection
1	Deflection 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	Deflection 2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	Deflection 3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	IBC 16-1		Yes	Yes		Yes	Yes	Yes	Yes	Yes
5	IBC 16-2 (a)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
6	IBC 16-2 (b)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
7	IBC 16-3 (a)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
8	IBC 16-3 (b) (a)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
9	IBC 16-3 (b) (b)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
10	IBC 16-3 (d) (a)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
11	IBC 16-3 (d) (b)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
12	IBC 16-4 (a) (a)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
13	IBC 16-4 (a) (b)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
14	IBC 16-4 (b) (a)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
15	IBC 16-4 (b) (b)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
16	IBC 16-6 (a)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
17	IBC 16-6 (b)		Yes	Yes		Yes	Yes	Yes	Yes	Yes
18	DEAD	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
19	LIVE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
20	ROOF LIVE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
21	WIND	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Node Reactions

	LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
0	1	F1	3.327	11.429	0	0	0	0
1	1	R3	0	0	0	0	0	0
2	1	R1	0	0	0	0	0	0
3	1	M1	0	0	0	0	0	0
4	1	M3	0	0	0	0	0	0
5	1	F3	1.871	-0.068	0	0	0	0
6	1	Totals:	5.198	11.361	0			
7	1	COG (ft):	X: 7.835	Y: 32	Z: 0			
8	2	F1	0.551	3.918	0	0	0	0
9	2	R3	0	0	0	0	0	0
10	2	R1	0	0	0	0	0	0
11	2	M1	0	0	0	0	0	0
12	2	M3	0	0	0	0	0	0
13	2	F3	-0.551	3.917	0	0	0	0
14	2	Totals:	0	7.835	0			
15	2	COG (ft):	X: 7.835	Y: 15.33	Z: 0			
16	3	F1	3.877	15.347	0	0	0	0
17	3	R3	0	0	0	0	0	0
18	3	R1	0	0	0	0	0	0
19	3	M1	0	0	0	0	0	0
20	3	M3	0	0	0	0	0	0
21	3	F3	1.321	3.848	0	0	0	0
22	3	Totals:	5.198	19.196	0			
23	3	COG (ft):	X: 7.835	Y: 25.196	Z: 0			
24	4	F1	4.657	16.002	0	0	0	0
25	4	R3	0	0	0	0	0	0
26	4	R1	0	0	0	0	0	0
27	4	M1	0	0	0	0	0	0
28	4	M3	0	0	0	0	0	0
29	4	F3	2.62	-0.097	0	0	0	0
30	4	Totals:	7.277	15.905	0			
31	4	COG (ft):	X: 7.835	Y: 32	Z: 0			
32	5	F1	5.245	22.826	0	0	0	0
33	5	R3	0	0	0	0	0	0
34	5	R1	0	0	0	0	0	0
35	5	M1	0	0	0	0	0	0
36	5	M3	0	0	0	0	0	0
37	5	F3	0.993	9.023	0	0	0	0
38	5	Totals:	6.237	31.849	0			
39	5	COG (ft):	X: 7.835	Y: 25.439	Z: 0			
40	6	F1	4.873	19.985	0	0	0	0
41	6	R3	0	0	0	0	0	0
42	6	R1	0	0	0	0	0	0

Node Reactions (Continued)

	LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
43	6	M1	0	0	0	0	0	0
44	6	M3	0	0	0	0	0	0
45	6	F3	1.365	6.184	0	0	0	0
46	6	Totals:	6.237	26.169	0			
47	6	COG (ft):	X: 7.835	Y: 24.014	Z: 0			
48	7	F1	5.457	24.767	0	0	0	0
49	7	R3	0	0	0	0	0	0
50	7	R1	0	0	0	0	0	0
51	7	M1	0	0	0	0	0	0
52	7	M3	0	0	0	0	0	0
53	7	F3	0.78	10.961	0	0	0	0
54	7	Totals:	6.237	35.728	0			
55	7	COG (ft):	X: 7.835	Y: 30.172	Z: 0			
56	8	F1	-0.271	4.327	0	0	0	0
57	8	R3	0	0	0	0	0	0
58	8	R1	0	0	0	0	0	0
59	8	M1	0	0	0	0	0	0
60	8	M3	0	0	0	0	0	0
61	8	F3	-4.641	27.483	0	0	0	0
62	8	Totals:	-4.913	31.81	0			
63	8	COG (ft):	X: 7.835	Y: 32	Z: 0			
64	9	F1	10.627	41.286	0	0	0	0
65	9	R3	0	0	0	0	0	0
66	9	R1	0	0	0	0	0	0
67	9	M1	0	0	0	0	0	0
68	9	M3	0	0	0	0	0	0
69	9	F3	6.76	-9.476	0	0	0	0
70	9	Totals:	17.387	31.81	0			
71	9	COG (ft):	X: 7.835	Y: 32	Z: 0			
72	10	F1	-1.461	-4.754	0	0	0	0
73	10	R3	0	0	0	0	0	0
74	10	R1	0	0	0	0	0	0
75	10	M1	0	0	0	0	0	0
76	10	M3	0	0	0	0	0	0
77	10	F3	-3.451	18.387	0	0	0	0
78	10	Totals:	-4.913	13.633	0			
79	10	COG (ft):	X: 7.835	Y: 32	Z: 0			
80	11	F1	9.437	32.183	0	0	0	0
81	11	R3	0	0	0	0	0	0
82	11	R1	0	0	0	0	0	0
83	11	M1	0	0	0	0	0	0
84	11	M3	0	0	0	0	0	0
85	11	F3	7.95	-18.55	0	0	0	0
86	11	Totals:	17.387	13.633	0			
87	11	COG (ft):	X: 7.835	Y: 32	Z: 0			
88	12	F1	-6.275	-18.435	0	0	0	0
89	12	R3	0	0	0	0	0	0
90	12	R1	0	0	0	0	0	0
91	12	M1	0	0	0	0	0	0
92	12	M3	0	0	0	0	0	0
93	12	F3	-9.788	41.666	0	0	0	0
94	12	Totals:	-16.063	23.231	0			
95	12	COG (ft):	X: 7.835	Y: 29.189	Z: 0			
96	13	F1	15.522	55.457	0	0	0	0
97	13	R3	0	0	0	0	0	0
98	13	R1	0	0	0	0	0	0
99	13	M1	0	0	0	0	0	0
100	13	M3	0	0	0	0	0	0
101	13	F3	13.016	-32.227	0	0	0	0
102	13	Totals:	28.537	23.231	0			
103	13	COG (ft):	X: 7.835	Y: 29.189	Z: 0			
104	14	F1	-6.647	-21.269	0	0	0	0
105	14	R3	0	0	0	0	0	0
106	14	R1	0	0	0	0	0	0
107	14	M1	0	0	0	0	0	0
108	14	M3	0	0	0	0	0	0
109	14	F3	-9.416	38.82	0	0	0	0
110	14	Totals:	-16.063	17.55	0			

Node Reactions (Continued)

LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
111	14	COG (ft):	X: 7.835	Y: 28.279	Z: 0		
112	15	F1	15.15	52.609	0	0	0
113	15	R3	0	0	0	0	0
114	15	R1	0	0	0	0	0
115	15	M1	0	0	0	0	0
116	15	M3	0	0	0	0	0
117	15	F3	13.388	-35.059	0	0	0
118	15	Totals:	28.537	17.55	0		
119	15	COG (ft):	X: 7.835	Y: 28.279	Z: 0		
120	16	F1	-7.922	-26.652	0	0	0
121	16	R3	0	0	0	0	0
122	16	R1	0	0	0	0	0
123	16	M1	0	0	0	0	0
124	16	M3	0	0	0	0	0
125	16	F3	-9.7	36.877	0	0	0
126	16	Totals:	-17.622	10.225	0		
127	16	COG (ft):	X: 7.835	Y: 32	Z: 0		
128	17	F1	13.878	47.215	0	0	0
129	17	R3	0	0	0	0	0
130	17	R1	0	0	0	0	0
131	17	M1	0	0	0	0	0
132	17	M3	0	0	0	0	0
133	17	F3	13.1	-36.99	0	0	0
134	17	Totals:	26.978	10.225	0		
135	17	COG (ft):	X: 7.835	Y: 32	Z: 0		
136	18	F1	3.327	11.429	0	0	0
137	18	R3	0	0	0	0	0
138	18	R1	0	0	0	0	0
139	18	M1	0	0	0	0	0
140	18	M3	0	0	0	0	0
141	18	F3	1.871	-0.068	0	0	0
142	18	Totals:	5.198	11.361	0		
143	18	COG (ft):	X: 7.835	Y: 32	Z: 0		
144	19	F1	0.551	3.918	0	0	0
145	19	R3	0	0	0	0	0
146	19	R1	0	0	0	0	0
147	19	M1	0	0	0	0	0
148	19	M3	0	0	0	0	0
149	19	F3	-0.551	3.917	0	0	0
150	19	Totals:	0	7.835	0		
151	19	COG (ft):	X: 7.835	Y: 15.33	Z: 0		
152	20	F1	0.744	5.68	0	0	0
153	20	R3	0	0	0	0	0
154	20	R1	0	0	0	0	0
155	20	M1	0	0	0	0	0
156	20	M3	0	0	0	0	0
157	20	F3	-0.744	5.68	0	0	0
158	20	Totals:	0	11.361	0		
159	20	COG (ft):	X: 7.835	Y: 32	Z: 0		
160	21	F1	-10.921	-36.927	0	0	0
161	21	R3	0	0	0	0	0
162	21	R1	0	0	0	0	0
163	21	M1	0	0	0	0	0
164	21	M3	0	0	0	0	0
165	21	F3	-11.379	36.927	0	0	0
166	21	Totals:	-22.3	0	0		
167	21	COG (ft):	NC	NC	NC		

Node Reactions - Overstrength or Capacity Limit

No Data to Print...

Node Displacements

LC	Node Label	X [in]	Y [in]	Z [in]	X Rotation [rad]	Y Rotation [rad]	Z Rotation [rad]
0	1	F1	0	0	0	0	2.346e-4
1	1	F3	0	0	0	0	2.264e-4
2	1	M1	-0.012	-0.006	0	0	9.121e-5
3	1	M3	-0.011	-0.001	0	0	8.916e-5

Node Displacements (Continued)

LC	Node Label	X [in]	Y [in]	Z [in]	X Rotation [rad]	Y Rotation [rad]	Z Rotation [rad]
4	1	R1	-0.022	-0.011	0	0	-2.055e-4
5	1	R3	-0.021	-0.005	0	0	-2.008e-4
6	1	N8	-0.017	-0.006	0	0	5.26e-5
7	1	N10	-0.005	-0.002	0	0	2.682e-5
8	2	F1	0	0	0	0	1.583e-6
9	2	F3	0	0	0	0	-1.583e-6
10	2	M1	0	-0.003	0	0	5.185e-8
11	2	M3	0	-0.003	0	0	-5.094e-8
12	2	R1	0	-0.003	0	0	-1.613e-6
13	2	R3	0	-0.003	0	0	1.615e-6
14	2	N8	0	-0.003	0	0	5.581e-7
15	2	N10	0	-0.001	0	0	-7.527e-6
16	3	F1	0	0	0	0	2.362e-4
17	3	F3	0	0	0	0	2.248e-4
18	3	M1	-0.013	-0.009	0	0	9.126e-5
19	3	M3	-0.011	-0.004	0	0	8.912e-5
20	3	R1	-0.022	-0.014	0	0	-2.071e-4
21	3	R3	-0.021	-0.007	0	0	-1.992e-4
22	3	N8	-0.017	-0.009	0	0	5.316e-5
23	3	N10	-0.005	-0.003	0	0	1.93e-5
24	4	F1	0	0	0	0	3.285e-4
25	4	F3	0	0	0	0	3.17e-4
26	4	M1	-0.017	-0.009	0	0	1.277e-4
27	4	M3	-0.016	-0.002	0	0	1.248e-4
28	4	R1	-0.03	-0.015	0	0	-2.877e-4
29	4	R3	-0.029	-0.007	0	0	-2.811e-4
30	4	N8	-0.023	-0.008	0	0	7.365e-5
31	4	N10	-0.007	-0.002	0	0	3.756e-5
32	5	F1	0	0	0	0	2.861e-4
33	5	F3	0	0	0	0	2.672e-4
34	5	M1	-0.015	-0.014	0	0	1.101e-4
35	5	M3	-0.013	-0.007	0	0	1.064e-4
36	5	R1	-0.026	-0.021	0	0	-2.503e-4
37	5	R3	-0.025	-0.014	0	0	-2.372e-4
38	5	N8	-0.02	-0.014	0	0	7.03e-5
39	5	N10	-0.006	-0.005	0	0	1.429e-5
40	6	F1	0	0	0	0	2.841e-4
41	6	F3	0	0	0	0	2.692e-4
42	6	M1	-0.015	-0.012	0	0	1.095e-4
43	6	M3	-0.013	-0.005	0	0	1.069e-4
44	6	R1	-0.026	-0.017	0	0	-2.492e-4
45	6	R3	-0.025	-0.01	0	0	-2.384e-4
46	6	N8	-0.02	-0.011	0	0	6.402e-5
47	6	N10	-0.006	-0.004	0	0	2.016e-5
48	7	F1	0	0	0	0	2.888e-4
49	7	F3	0	0	0	0	2.645e-4
50	7	M1	-0.016	-0.015	0	0	1.112e-4
51	7	M3	-0.012	-0.009	0	0	1.054e-4
52	7	R1	-0.027	-0.027	0	0	-2.509e-4
53	7	R3	-0.025	-0.019	0	0	-2.365e-4
54	7	N8	-0.02	-0.018	0	0	8.348e-5
55	7	N10	-0.006	-0.005	0	0	9.658e-6
56	8	F1	0	0	0	0	1.106e-4
57	8	F3	0	0	0	0	9.376e-5
58	8	M1	0.018	-0.004	0	0	-8.615e-5
59	8	M3	0.02	-0.017	0	0	-8.439e-5
60	8	R1	0.05	-0.012	0	0	-4.69e-4
61	8	R3	0.049	-0.031	0	0	-4.47e-4
62	8	N8	0.032	-0.017	0	0	-9.048e-5
63	8	N10	0.006	-0.005	0	0	-1.001e-4
64	9	F1	0	0	0	0	4.655e-4
65	9	F3	0	0	0	0	4.368e-4
66	9	M1	-0.05	-0.024	0	0	3.084e-4
67	9	M3	-0.045	0.002	0	0	2.952e-4
68	9	R1	-0.103	-0.039	0	0	-3.124e-5
69	9	R3	-0.098	-0.006	0	0	-2.776e-5
70	9	N8	-0.072	-0.016	0	0	2.568e-4
71	9	N10	-0.018	-0.004	0	0	1.27e-4

Node Displacements (Continued)

	LC	Node Label	X [in]	Y [in]	Z [in]	X Rotation [rad]	Y Rotation [rad]	Z Rotation [rad]
72	10	F1	0	0	0	0	0	1.042e-4
73	10	F3	0	0	0	0	0	1.002e-4
74	10	M1	0.019	0.002	0	0	0	-8.773e-5
75	10	M3	0.019	-0.011	0	0	0	-8.266e-5
76	10	R1	0.05	0	0	0	0	-4.653e-4
77	10	R3	0.048	-0.018	0	0	0	-4.504e-4
78	10	N8	0.032	-0.007	0	0	0	-1.104e-4
79	10	N10	0.006	-0.002	0	0	0	-8.131e-5
80	11	F1	0	0	0	0	0	4.589e-4
81	11	F3	0	0	0	0	0	4.432e-4
82	11	M1	-0.049	-0.018	0	0	0	3.066e-4
83	11	M3	-0.046	0.009	0	0	0	2.966e-4
84	11	R1	-0.102	-0.027	0	0	0	-2.789e-5
85	11	R3	-0.099	0.007	0	0	0	-3.153e-5
86	11	N8	-0.072	-0.007	0	0	0	2.367e-4
87	11	N10	-0.018	-0.002	0	0	0	1.457e-4
88	12	F1	0	0	0	0	0	-7.044e-5
89	12	F3	0	0	0	0	0	-7.407e-5
90	12	M1	0.052	0.009	0	0	0	-2.845e-4
91	12	M3	0.052	-0.024	0	0	0	-2.73e-4
92	12	R1	0.126	0.008	0	0	0	-6.86e-4
93	12	R3	0.121	-0.036	0	0	0	-6.581e-4
94	12	N8	0.085	-0.012	0	0	0	-2.776e-4
95	12	N10	0.018	-0.004	0	0	0	-2.045e-4
96	13	F1	0	0	0	0	0	6.392e-4
97	13	F3	0	0	0	0	0	6.119e-4
98	13	M1	-0.083	-0.031	0	0	0	5.044e-4
99	13	M3	-0.078	0.015	0	0	0	4.858e-4
100	13	R1	-0.179	-0.045	0	0	0	1.89e-4
101	13	R3	-0.172	0.014	0	0	0	1.799e-4
102	13	N8	-0.125	-0.011	0	0	0	4.168e-4
103	13	N10	-0.029	-0.003	0	0	0	2.496e-4
104	14	F1	0	0	0	0	0	-7.242e-5
105	14	F3	0	0	0	0	0	-7.202e-5
106	14	M1	0.053	0.011	0	0	0	-2.849e-4
107	14	M3	0.052	-0.022	0	0	0	-2.724e-4
108	14	R1	0.126	0.012	0	0	0	-6.848e-4
109	14	R3	0.121	-0.032	0	0	0	-6.591e-4
110	14	N8	0.085	-0.009	0	0	0	-2.838e-4
111	14	N10	0.018	-0.003	0	0	0	-1.986e-4
112	15	F1	0	0	0	0	0	6.371e-4
113	15	F3	0	0	0	0	0	6.139e-4
114	15	M1	-0.083	-0.029	0	0	0	5.038e-4
115	15	M3	-0.079	0.017	0	0	0	4.863e-4
116	15	R1	-0.178	-0.041	0	0	0	1.9e-4
117	15	R3	-0.172	0.018	0	0	0	1.787e-4
118	15	N8	-0.125	-0.008	0	0	0	4.104e-4
119	15	N10	-0.029	-0.002	0	0	0	2.554e-4
120	16	F1	0	0	0	0	0	-1.436e-4
121	16	F3	0	0	0	0	0	-1.391e-4
122	16	M1	0.057	0.014	0	0	0	-3.122e-4
123	16	M3	0.055	-0.021	0	0	0	-2.991e-4
124	16	R1	0.133	0.017	0	0	0	-6.223e-4
125	16	R3	0.128	-0.029	0	0	0	-5.996e-4
126	16	N8	0.09	-0.006	0	0	0	-2.998e-4
127	16	N10	0.019	-0.002	0	0	0	-2.028e-4
128	17	F1	0	0	0	0	0	5.659e-4
129	17	F3	0	0	0	0	0	5.467e-4
130	17	M1	-0.079	-0.026	0	0	0	4.763e-4
131	17	M3	-0.075	0.019	0	0	0	4.595e-4
132	17	R1	-0.172	-0.037	0	0	0	2.523e-4
133	17	R3	-0.165	0.021	0	0	0	2.38e-4
134	17	N8	-0.12	-0.005	0	0	0	3.943e-4
135	17	N10	-0.028	-0.001	0	0	0	2.511e-4
136	18	F1	0	0	0	0	0	2.346e-4
137	18	F3	0	0	0	0	0	2.264e-4
138	18	M1	-0.012	-0.006	0	0	0	9.121e-5
139	18	M3	-0.011	-0.001	0	0	0	8.916e-5

Node Displacements (Continued)

	LC	Node Label	X [in]	Y [in]	Z [in]	X Rotation [rad]	Y Rotation [rad]	Z Rotation [rad]
140	18	R1	-0.022	-0.011	0	0	0	-2.055e-4
141	18	R3	-0.021	-0.005	0	0	0	-2.008e-4
142	18	N8	-0.017	-0.006	0	0	0	5.26e-5
143	18	N10	-0.005	-0.002	0	0	0	2.682e-5
144	19	F1	0	0	0	0	0	1.583e-6
145	19	F3	0	0	0	0	0	-1.583e-6
146	19	M1	0	-0.003	0	0	0	5.185e-8
147	19	M3	0	-0.003	0	0	0	-5.094e-8
148	19	R1	0	-0.003	0	0	0	-1.613e-6
149	19	R3	0	-0.003	0	0	0	1.615e-6
150	19	N8	0	-0.003	0	0	0	5.581e-7
151	19	N10	0	-0.001	0	0	0	-7.527e-6
152	20	F1	0	0	0	0	0	4.028e-6
153	20	F3	0	0	0	0	0	-4.027e-6
154	20	M1	-0.001	-0.004	0	0	0	1.033e-6
155	20	M3	0.001	-0.004	0	0	0	-1.031e-6
156	20	R1	0	-0.008	0	0	0	-2.223e-6
157	20	R3	0	-0.008	0	0	0	2.227e-6
158	20	N8	0	-0.006	0	0	0	1.253e-5
159	20	N10	0	-0.002	0	0	0	-1.175e-5
160	21	F1	0	0	0	0	0	-3.546e-4
161	21	F3	0	0	0	0	0	-3.428e-4
162	21	M1	0.068	0.02	0	0	0	-3.942e-4
163	21	M3	0.065	-0.02	0	0	0	-3.792e-4
164	21	R1	0.152	0.027	0	0	0	-4.372e-4
165	21	R3	0.146	-0.025	0	0	0	-4.187e-4
166	21	N8	0.105	0	0	0	0	-3.47e-4
167	21	N10	0.024	-0.001	0	0	0	-2.269e-4

Member Section Forces

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
0	1	M1	1	8.46	-0.214	0	0	0	0
1			2	8.46	-0.068	0	0	0	0.541
2			3	8.46	0.078	0	0	0	0.523
3			4	8.46	0.223	0	0	0	-0.053
4			5	8.46	0.369	0	0	0	-1.189
5	1	M2	1	5.531	-0.389	0	0	0	-1.189
6			2	5.531	-0.23	0	0	0	0.1
7			3	5.531	-0.071	0	0	0	0.727
8			4	5.531	0.087	0	0	0	0.694
9			5	5.531	0.246	0	0	0	0
10	1	M4	1	1.45	-0.213	0	0	0	0
11			2	1.45	-0.067	0	0	0	0.538
12			3	1.45	0.078	0	0	0	0.517
13			4	1.45	0.224	0	0	0	-0.063
14			5	1.45	0.37	0	0	0	-1.202
15	1	M5	1	4.301	-0.389	0	0	0	-1.202
16			2	4.301	-0.231	0	0	0	0.09
17			3	4.301	-0.072	0	0	0	0.721
18			4	4.301	0.086	0	0	0	0.691
19			5	4.301	0.245	0	0	0	0
20	1	M6	1	-0.469	5.68	0	0	0	0
21			2	-0.587	2.84	0	0	0	-16.69
22			3	-0.705	0	0	0	0	-22.253
23			4	-0.823	-2.84	0	0	0	-16.69
24			5	-0.941	-5.68	0	0	0	0
25	1	M10	1	-1.204	0	0	0	0	0
26			2	-1.345	0	0	0	0	0
27			3	-1.486	0	0	0	0	0
28			4	-1.628	0	0	0	0	0
29			5	-1.769	0	0	0	0	0
30	1	M7	1	0.261	0.06	0	0	0	0
31			2	0.223	0.02	0	0	0	-0.115
32			3	0.186	-0.02	0	0	0	-0.115
33			4	0.148	-0.06	0	0	0	0
34			5	0.11	-0.1	0	0	0	0.229
35	1	M8	1	3.857	-0.055	0	0	0	0
36			2	3.895	-0.018	0	0	0	0.099

Member Section Forces (Continued)

LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
37		3	3.932	0.019	0	0	0	0.097
38		4	3.97	0.056	0	0	0	-0.006
39		5	4.008	0.093	0	0	0	-0.21
40	1	1	-0.063	0.1	0	0	0	0.229
41		2	-0.101	0.06	0	0	0	0
42		3	-0.138	0.02	0	0	0	-0.115
43		4	-0.176	-0.02	0	0	0	-0.115
44		5	-0.214	-0.06	0	0	0	0
45	1	1	4.151	-0.093	0	0	0	-0.21
46		2	4.189	-0.056	0	0	0	-0.006
47		3	4.227	-0.019	0	0	0	0.097
48		4	4.264	0.018	0	0	0	0.099
49		5	4.302	0.055	0	0	0	0
50	1	1	1.818	-0.08	0	0	0	0
51		2	1.855	-0.04	0	0	0	0.172
52		3	1.893	0	0	0	0	0.229
53		4	1.931	0.04	0	0	0	0.172
54		5	1.968	0.08	0	0	0	0
55	1	1	2.179	-0.08	0	0	0	0
56		2	2.217	-0.04	0	0	0	0.172
57		3	2.255	0	0	0	0	0.229
58		4	2.292	0.04	0	0	0	0.172
59		5	2.33	0.08	0	0	0	0
60	1	1	-1.763	0.074	0	0	0	0
61		2	-1.801	0.037	0	0	0	-0.152
62		3	-1.839	0	0	0	0	-0.202
63		4	-1.876	-0.037	0	0	0	-0.152
64		5	-1.914	-0.074	0	0	0	0
65	1	1	-2.097	0.074	0	0	0	0
66		2	-2.134	0.037	0	0	0	-0.152
67		3	-2.172	0	0	0	0	-0.202
68		4	-2.21	-0.037	0	0	0	-0.152
69		5	-2.247	-0.074	0	0	0	0
70	2	1	3.379	0	0	0	0	0
71		2	3.379	0	0	0	0	0.001
72		3	3.379	0	0	0	0	0.002
73		4	3.379	0	0	0	0	0.002
74		5	3.379	0	0	0	0	0.003
75	2	1	0.034	0	0	0	0	0.003
76		2	0.034	0	0	0	0	0.002
77		3	0.034	0	0	0	0	0.002
78		4	0.034	0	0	0	0	0.001
79		5	0.034	0	0	0	0	0
80	2	1	3.379	0	0	0	0	0
81		2	3.379	0	0	0	0	-0.001
82		3	3.379	0	0	0	0	-0.002
83		4	3.379	0	0	0	0	-0.002
84		5	3.379	0	0	0	0	-0.003
85	2	1	0.034	0	0	0	0	-0.003
86		2	0.034	0	0	0	0	-0.002
87		3	0.034	0	0	0	0	-0.002
88		4	0.034	0	0	0	0	-0.001
89		5	0.034	0	0	0	0	0
90	2	1	0.032	0	0	0	0	0
91		2	0.032	0	0	0	0	0
92		3	0.032	0	0	0	0	0
93		4	0.032	0	0	0	0	0
94		5	0.032	0	0	0	0	0
95	2	1	-0.518	3.917	0	0	0	0
96		2	-0.518	1.959	0	0	0	-11.51
97		3	-0.518	0	0	0	0	-15.347
98		4	-0.518	-1.959	0	0	0	-11.51
99		5	-0.518	-3.918	0	0	0	0
100	2	1	-0.047	0	0	0	0	0
101		2	-0.047	0	0	0	0	0
102		3	-0.047	0	0	0	0	0
103		4	-0.047	0	0	0	0	-0.001
104		5	-0.047	0	0	0	0	-0.001

Member Section Forces (Continued)

LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
105	2	M8	1	0.77	0	0	0	0
106			2	0.77	0	0	0	0
107			3	0.77	0	0	0	0
108			4	0.77	0	0	0	0.001
109			5	0.77	0	0	0	0.001
110	2	M9	1	-0.047	0	0	0	-0.001
111			2	-0.047	0	0	0	-0.001
112			3	-0.047	0	0	0	0
113			4	-0.047	0	0	0	0
114			5	-0.047	0	0	0	0
115	2	M11	1	0.77	0	0	0	0.001
116			2	0.77	0	0	0	0.001
117			3	0.77	0	0	0	0
118			4	0.77	0	0	0	0
119			5	0.77	0	0	0	0
120	2	M12	1	-0.047	0	0	0	0
121			2	-0.047	0	0	0	0
122			3	-0.047	0	0	0	0
123			4	-0.047	0	0	0	0
124			5	-0.047	0	0	0	0
125	2	M13	1	-0.047	0	0	0	0
126			2	-0.047	0	0	0	0
127			3	-0.047	0	0	0	0
128			4	-0.047	0	0	0	0
129			5	-0.047	0	0	0	0
130	2	M14	1	0.77	0	0	0	0
131			2	0.77	0	0	0	0
132			3	0.77	0	0	0	0
133			4	0.77	0	0	0	0
134			5	0.77	0	0	0	0
135	2	M15	1	0.77	0	0	0	0
136			2	0.77	0	0	0	0
137			3	0.77	0	0	0	0
138			4	0.77	0	0	0	0
139			5	0.77	0	0	0	0
140	3	M1	1	11.839	-0.214	0	0	0
141			2	11.839	-0.068	0	0	0.542
142			3	11.839	0.077	0	0	0.525
143			4	11.839	0.223	0	0	-0.051
144			5	11.839	0.369	0	0	-1.186
145	3	M2	1	5.565	-0.388	0	0	-1.186
146			2	5.565	-0.23	0	0	0.102
147			3	5.565	-0.071	0	0	0.729
148			4	5.565	0.087	0	0	0.695
149			5	5.565	0.246	0	0	0
150	3	M4	1	4.829	-0.213	0	0	0
151			2	4.829	-0.067	0	0	0.537
152			3	4.829	0.079	0	0	0.515
153			4	4.829	0.225	0	0	-0.066
154			5	4.829	0.37	0	0	-1.206
155	3	M5	1	4.335	-0.39	0	0	-1.206
156			2	4.335	-0.231	0	0	0.087
157			3	4.335	-0.072	0	0	0.719
158			4	4.335	0.086	0	0	0.69
159			5	4.335	0.245	0	0	0
160	3	M6	1	-0.437	5.68	0	0	0
161			2	-0.555	2.84	0	0	-16.69
162			3	-0.673	0	0	0	-22.253
163			4	-0.791	-2.84	0	0	-16.69
164			5	-0.909	-5.68	0	0	0
165	3	M10	1	-1.722	3.917	0	0	0
166			2	-1.863	1.959	0	0	-11.51
167			3	-2.004	0	0	0	-15.347
168			4	-2.146	-1.959	0	0	-11.51
169			5	-2.287	-3.918	0	0	0
170	3	M7	1	0.214	0.06	0	0	0
171			2	0.177	0.02	0	0	-0.115
172			3	0.139	-0.02	0	0	-0.115

Member Section Forces (Continued)

LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
173		4	0.101	-0.06	0	0	0	-0.001
174		5	0.064	-0.1	0	0	0	0.229
175	3	1	4.627	-0.055	0	0	0	0
176		2	4.665	-0.018	0	0	0	0.099
177		3	4.703	0.019	0	0	0	0.097
178		4	4.741	0.056	0	0	0	-0.005
179		5	4.778	0.093	0	0	0	-0.209
180	3	1	-0.11	0.1	0	0	0	0.229
181		2	-0.147	0.06	0	0	0	-0.001
182		3	-0.185	0.02	0	0	0	-0.115
183		4	-0.223	-0.02	0	0	0	-0.115
184		5	-0.26	-0.06	0	0	0	0
185	3	1	4.922	-0.093	0	0	0	-0.209
186		2	4.96	-0.056	0	0	0	-0.005
187		3	4.997	-0.019	0	0	0	0.097
188		4	5.035	0.018	0	0	0	0.099
189		5	5.073	0.055	0	0	0	0
190	3	1	1.771	-0.08	0	0	0	0
191		2	1.809	-0.04	0	0	0	0.172
192		3	1.846	0	0	0	0	0.229
193		4	1.884	0.04	0	0	0	0.172
194		5	1.922	0.08	0	0	0	0
195	3	1	2.132	-0.08	0	0	0	0
196		2	2.17	-0.04	0	0	0	0.172
197		3	2.208	0	0	0	0	0.229
198		4	2.246	0.04	0	0	0	0.172
199		5	2.283	0.08	0	0	0	0
200	3	1	-0.994	0.074	0	0	0	0
201		2	-1.031	0.037	0	0	0	-0.152
202		3	-1.069	0	0	0	0	-0.202
203		4	-1.107	-0.037	0	0	0	-0.152
204		5	-1.144	-0.074	0	0	0	0
205	3	1	-1.327	0.074	0	0	0	0
206		2	-1.365	0.037	0	0	0	-0.152
207		3	-1.402	0	0	0	0	-0.202
208		4	-1.44	-0.037	0	0	0	-0.152
209		5	-1.478	-0.074	0	0	0	0
210	4	1	11.844	-0.3	0	0	0	0
211		2	11.844	-0.096	0	0	0	0.758
212		3	11.844	0.109	0	0	0	0.733
213		4	11.844	0.313	0	0	0	-0.075
214		5	11.844	0.517	0	0	0	-1.665
215	4	1	7.744	-0.544	0	0	0	-1.665
216		2	7.744	-0.322	0	0	0	0.139
217		3	7.744	-0.1	0	0	0	1.018
218		4	7.744	0.122	0	0	0	0.972
219		5	7.744	0.344	0	0	0	0
220	4	1	2.03	-0.299	0	0	0	0
221		2	2.03	-0.094	0	0	0	0.753
222		3	2.03	0.11	0	0	0	0.724
223		4	2.03	0.314	0	0	0	-0.088
224		5	2.03	0.518	0	0	0	-1.683
225	4	1	6.021	-0.545	0	0	0	-1.683
226		2	6.021	-0.323	0	0	0	0.126
227		3	6.021	-0.101	0	0	0	1.009
228		4	6.021	0.121	0	0	0	0.967
229		5	6.021	0.343	0	0	0	0
230	4	1	-0.657	7.953	0	0	0	0
231		2	-0.822	3.976	0	0	0	-23.366
232		3	-0.987	0	0	0	0	-31.154
233		4	-1.152	-3.976	0	0	0	-23.366
234		5	-1.317	-7.953	0	0	0	0
235	4	1	-1.685	0	0	0	0	0
236		2	-1.883	0	0	0	0	0
237		3	-2.081	0	0	0	0	0
238		4	-2.279	0	0	0	0	0
239		5	-2.477	0	0	0	0	0
240	4	1	0.365	0.084	0	0	0	0

Member Section Forces (Continued)

LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
241		2	0.312	0.028	0	0	0	-0.161
242		3	0.26	-0.028	0	0	0	-0.161
243		4	0.207	-0.084	0	0	0	0
244		5	0.154	-0.14	0	0	0	0.321
245	4	1	5.4	-0.076	0	0	0	0
246		2	5.453	-0.025	0	0	0	0.139
247		3	5.506	0.027	0	0	0	0.136
248		4	5.558	0.079	0	0	0	-0.009
249		5	5.611	0.13	0	0	0	-0.294
250	4	1	-0.088	0.14	0	0	0	0.321
251		2	-0.141	0.084	0	0	0	0
252		3	-0.194	0.028	0	0	0	-0.161
253		4	-0.247	-0.028	0	0	0	-0.161
254		5	-0.3	-0.084	0	0	0	0
255	4	1	5.812	-0.13	0	0	0	-0.294
256		2	5.865	-0.079	0	0	0	-0.009
257		3	5.918	-0.027	0	0	0	0.136
258		4	5.971	0.025	0	0	0	0.139
259		5	6.023	0.076	0	0	0	0
260	4	1	2.545	-0.112	0	0	0	0
261		2	2.598	-0.056	0	0	0	0.241
262		3	2.65	0	0	0	0	0.321
263		4	2.703	0.056	0	0	0	0.241
264		5	2.756	0.112	0	0	0	0
265	4	1	3.051	-0.112	0	0	0	0
266		2	3.104	-0.056	0	0	0	0.241
267		3	3.157	0	0	0	0	0.321
268		4	3.21	0.056	0	0	0	0.241
269		5	3.262	0.112	0	0	0	0
270	4	1	-2.469	0.103	0	0	0	0
271		2	-2.522	0.052	0	0	0	-0.212
272		3	-2.574	0	0	0	0	-0.283
273		4	-2.627	-0.052	0	0	0	-0.212
274		5	-2.68	-0.103	0	0	0	0
275	4	1	-2.936	0.103	0	0	0	0
276		2	-2.988	0.052	0	0	0	-0.212
277		3	-3.041	0	0	0	0	-0.283
278		4	-3.094	-0.052	0	0	0	-0.212
279		5	-3.147	-0.103	0	0	0	0
280	5	1	18.037	-0.258	0	0	0	0
281		2	18.037	-0.082	0	0	0	0.652
282		3	18.037	0.093	0	0	0	0.632
283		4	18.037	0.268	0	0	0	-0.058
284		5	18.037	0.443	0	0	0	-1.419
285	5	1	9.15	-0.466	0	0	0	-1.419
286		2	9.15	-0.275	0	0	0	0.126
287		3	9.15	-0.085	0	0	0	0.877
288		4	9.15	0.105	0	0	0	0.835
289		5	9.15	0.296	0	0	0	0
290	5	1	9.621	-0.255	0	0	0	0
291		2	9.621	-0.08	0	0	0	0.644
292		3	9.621	0.095	0	0	0	0.616
293		4	9.621	0.27	0	0	0	-0.082
294		5	9.621	0.445	0	0	0	-1.451
295	5	1	7.673	-0.468	0	0	0	-1.451
296		2	7.673	-0.277	0	0	0	0.102
297		3	7.673	-0.087	0	0	0	0.861
298		4	7.673	0.103	0	0	0	0.827
299		5	7.673	0.294	0	0	0	0
300	5	1	-0.872	9.657	0	0	0	0
301		2	-1.013	4.828	0	0	0	-28.372
302		3	-1.155	0	0	0	0	-37.83
303		4	-1.296	-4.828	0	0	0	-28.372
304		5	-1.438	-9.657	0	0	0	0
305	5	1	-3.004	6.268	0	0	0	0
306		2	-3.174	3.134	0	0	0	-18.416
307		3	-3.343	0	0	0	0	-24.555
308		4	-3.513	-3.134	0	0	0	-18.416

Member Section Forces (Continued)

LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
309		5	-3.682	-6.268	0	0	0	0
310	5	M7	1	0.763	0.072	0	0	0
311		2	0.718	0.024	0	0	0	-0.138
312		3	0.672	-0.024	0	0	0	-0.139
313		4	0.627	-0.072	0	0	0	-0.001
314		5	0.582	-0.12	0	0	0	0.273
315	5	M8	1	6.382	-0.066	0	0	0
316		2	6.427	-0.021	0	0	0	0.12
317		3	6.472	0.023	0	0	0	0.118
318		4	6.518	0.067	0	0	0	-0.005
319		5	6.563	0.111	0	0	0	-0.25
320	5	M9	1	0.374	0.12	0	0	0.273
321		2	0.329	0.072	0	0	0	-0.001
322		3	0.284	0.024	0	0	0	-0.139
323		4	0.238	-0.024	0	0	0	-0.138
324		5	0.193	-0.072	0	0	0	0
325	5	M11	1	6.735	-0.111	0	0	-0.25
326		2	6.78	-0.067	0	0	0	-0.005
327		3	6.826	-0.023	0	0	0	0.118
328		4	6.871	0.021	0	0	0	0.12
329		5	6.916	0.066	0	0	0	0
330	5	M12	1	2.632	-0.096	0	0	0
331		2	2.677	-0.048	0	0	0	0.206
332		3	2.722	0	0	0	0	0.275
333		4	2.767	0.048	0	0	0	0.206
334		5	2.813	0.096	0	0	0	0
335	5	M13	1	3.065	-0.096	0	0	0
336		2	3.111	-0.048	0	0	0	0.206
337		3	3.156	0	0	0	0	0.275
338		4	3.201	0.048	0	0	0	0.206
339		5	3.246	0.096	0	0	0	0
340	5	M14	1	-0.366	0.089	0	0	0
341		2	-0.411	0.044	0	0	0	-0.182
342		3	-0.456	0	0	0	0	-0.243
343		4	-0.501	-0.044	0	0	0	-0.182
344		5	-0.547	-0.089	0	0	0	0
345	5	M15	1	-0.765	0.089	0	0	0
346		2	-0.81	0.044	0	0	0	-0.182
347		3	-0.856	0	0	0	0	-0.243
348		4	-0.901	-0.044	0	0	0	-0.182
349		5	-0.946	-0.089	0	0	0	0
350	6	M1	1	15.559	-0.257	0	0	0
351		2	15.559	-0.082	0	0	0	0.651
352		3	15.559	0.093	0	0	0	0.631
353		4	15.559	0.268	0	0	0	-0.06
354		5	15.559	0.443	0	0	0	-1.422
355	6	M2	1	6.692	-0.466	0	0	-1.422
356		2	6.692	-0.276	0	0	0	0.123
357		3	6.692	-0.085	0	0	0	0.876
358		4	6.692	0.105	0	0	0	0.834
359		5	6.692	0.295	0	0	0	0
360	6	M4	1	7.146	-0.256	0	0	0
361		2	7.146	-0.081	0	0	0	0.644
362		3	7.146	0.094	0	0	0	0.618
363		4	7.146	0.269	0	0	0	-0.08
364		5	7.146	0.445	0	0	0	-1.448
365	6	M5	1	5.216	-0.468	0	0	-1.448
366		2	5.216	-0.277	0	0	0	0.104
367		3	5.216	-0.087	0	0	0	0.863
368		4	5.216	0.103	0	0	0	0.828
369		5	5.216	0.294	0	0	0	0
370	6	M6	1	-0.512	6.816	0	0	0
371		2	-0.654	3.408	0	0	0	-20.028
372		3	-0.795	0	0	0	0	-26.703
373		4	-0.937	-3.408	0	0	0	-20.028
374		5	-1.078	-6.816	0	0	0	0
375	6	M10	1	-2.274	6.268	0	0	0
376		2	-2.443	3.134	0	0	0	-18.416

Member Section Forces (Continued)

LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
377		3	-2.613	0	0	0	0	-24.555
378		4	-2.782	-3.134	0	0	0	-18.416
379		5	-2.952	-6.268	0	0	0	0
380	6	1	0.238	0.072	0	0	0	0
381		2	0.193	0.024	0	0	0	-0.138
382		3	0.148	-0.024	0	0	0	-0.138
383		4	0.103	-0.072	0	0	0	-0.001
384		5	0.057	-0.12	0	0	0	0.274
385	6	1	5.861	-0.066	0	0	0	0
386		2	5.907	-0.021	0	0	0	0.119
387		3	5.952	0.023	0	0	0	0.117
388		4	5.997	0.067	0	0	0	-0.006
389		5	6.042	0.111	0	0	0	-0.251
390	6	1	-0.15	0.12	0	0	0	0.274
391		2	-0.196	0.072	0	0	0	-0.001
392		3	-0.241	0.024	0	0	0	-0.138
393		4	-0.286	-0.024	0	0	0	-0.138
394		5	-0.331	-0.072	0	0	0	0
395	6	1	6.215	-0.111	0	0	0	-0.251
396		2	6.26	-0.067	0	0	0	-0.006
397		3	6.305	-0.023	0	0	0	0.117
398		4	6.35	0.021	0	0	0	0.119
399		5	6.396	0.066	0	0	0	0
400	6	1	2.107	-0.096	0	0	0	0
401		2	2.152	-0.048	0	0	0	0.206
402		3	2.197	0	0	0	0	0.275
403		4	2.242	0.048	0	0	0	0.206
404		5	2.288	0.096	0	0	0	0
405	6	1	2.54	-0.096	0	0	0	0
406		2	2.586	-0.048	0	0	0	0.206
407		3	2.631	0	0	0	0	0.275
408		4	2.676	0.048	0	0	0	0.206
409		5	2.721	0.096	0	0	0	0
410	6	1	-0.885	0.089	0	0	0	0
411		2	-0.93	0.044	0	0	0	-0.182
412		3	-0.975	0	0	0	0	-0.243
413		4	-1.021	-0.044	0	0	0	-0.182
414		5	-1.066	-0.089	0	0	0	0
415	6	1	-1.285	0.089	0	0	0	0
416		2	-1.33	0.044	0	0	0	-0.182
417		3	-1.375	0	0	0	0	-0.243
418		4	-1.42	-0.044	0	0	0	-0.182
419		5	-1.466	-0.089	0	0	0	0
420	7	1	19.77	-0.258	0	0	0	0
421		2	19.77	-0.083	0	0	0	0.652
422		3	19.77	0.092	0	0	0	0.634
423		4	19.77	0.267	0	0	0	-0.055
424		5	19.77	0.442	0	0	0	-1.415
425	7	1	14.521	-0.466	0	0	0	-1.415
426		2	14.521	-0.275	0	0	0	0.128
427		3	14.521	-0.085	0	0	0	0.879
428		4	14.521	0.105	0	0	0	0.836
429		5	14.521	0.296	0	0	0	0
430	7	1	11.352	-0.255	0	0	0	0
431		2	11.352	-0.08	0	0	0	0.643
432		3	11.352	0.095	0	0	0	0.614
433		4	11.352	0.27	0	0	0	-0.085
434		5	11.352	0.445	0	0	0	-1.454
435	7	1	13.042	-0.468	0	0	0	-1.454
436		2	13.042	-0.278	0	0	0	0.099
437		3	13.042	-0.087	0	0	0	0.859
438		4	13.042	0.103	0	0	0	0.826
439		5	13.042	0.293	0	0	0	0
440	7	1	-1.698	15.905	0	0	0	0
441		2	-1.839	7.953	0	0	0	-46.731
442		3	-1.981	0	0	0	0	-62.308
443		4	-2.122	-7.953	0	0	0	-46.731
444		5	-2.264	-15.905	0	0	0	0

Member Section Forces (Continued)

LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
445	7	M10	1	-4.042	1.959	0	0	0
446			2	-4.212	0.979	0	0	-5.755
447			3	-4.381	0	0	0	-7.673
448			4	-4.551	-0.979	0	0	-5.755
449			5	-4.72	-1.959	0	0	0
450	7	M7	1	1.968	0.072	0	0	0
451			2	1.923	0.024	0	0	-0.138
452			3	1.877	-0.024	0	0	-0.139
453			4	1.832	-0.072	0	0	-0.001
454			5	1.787	-0.12	0	0	0.273
455	7	M8	1	6.679	-0.066	0	0	0
456			2	6.724	-0.022	0	0	0.12
457			3	6.769	0.023	0	0	0.119
458			4	6.815	0.067	0	0	-0.004
459			5	6.86	0.111	0	0	-0.248
460	7	M9	1	1.579	0.12	0	0	0.273
461			2	1.534	0.072	0	0	-0.001
462			3	1.489	0.024	0	0	-0.139
463			4	1.443	-0.024	0	0	-0.138
464			5	1.398	-0.072	0	0	0
465	7	M11	1	7.032	-0.111	0	0	-0.248
466			2	7.077	-0.067	0	0	-0.004
467			3	7.123	-0.023	0	0	0.119
468			4	7.168	0.022	0	0	0.12
469			5	7.213	0.066	0	0	0
470	7	M12	1	3.838	-0.096	0	0	0
471			2	3.884	-0.048	0	0	0.206
472			3	3.929	0	0	0	0.275
473			4	3.974	0.048	0	0	0.206
474			5	4.019	0.096	0	0	0
475	7	M13	1	4.272	-0.096	0	0	0
476			2	4.317	-0.048	0	0	0.206
477			3	4.363	0	0	0	0.275
478			4	4.408	0.048	0	0	0.206
479			5	4.453	0.096	0	0	0
480	7	M14	1	-0.069	0.089	0	0	0
481			2	-0.114	0.044	0	0	-0.182
482			3	-0.16	0	0	0	-0.243
483			4	-0.205	-0.044	0	0	-0.182
484			5	-0.25	-0.089	0	0	0
485	7	M15	1	-0.469	0.089	0	0	0
486			2	-0.514	0.044	0	0	-0.182
487			3	-0.559	0	0	0	-0.243
488			4	-0.604	-0.044	0	0	-0.182
489			5	-0.65	-0.089	0	0	0
490	8	M1	1	4.945	-0.26	0	0	0
491			2	4.945	-0.085	0	0	0.662
492			3	4.945	0.09	0	0	0.654
493			4	4.945	0.265	0	0	-0.025
494			5	4.945	0.44	0	0	-1.375
495	8	M2	1	10.343	-0.463	0	0	-1.375
496			2	10.343	-0.273	0	0	0.158
497			3	10.343	-0.083	0	0	0.899
498			4	10.343	0.108	0	0	0.846
499			5	10.343	0.298	0	0	0
500	8	M4	1	22.562	-0.258	0	0	0
501			2	22.562	-0.083	0	0	0.653
502			3	22.562	0.092	0	0	0.634
503			4	22.562	0.267	0	0	-0.055
504			5	22.562	0.442	0	0	-1.414
505	8	M5	1	16.423	-0.466	0	0	-1.414
506			2	16.423	-0.275	0	0	0.129
507			3	16.423	-0.085	0	0	0.879
508			4	16.423	0.105	0	0	0.836
509			5	16.423	0.296	0	0	0
510	8	M6	1	1.477	15.905	0	0	0
511			2	1.336	7.953	0	0	-46.731
512			3	1.194	0	0	0	-62.308

Member Section Forces (Continued)

LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
513		4	1.052	-7.953	0	0	0	-46.731
514		5	0.911	-15.905	0	0	0	0
515	8	1	-2.232	0	0	0	0	0
516		2	-2.401	0	0	0	0	0
517		3	-2.571	0	0	0	0	0
518		4	-2.74	0	0	0	0	0
519		5	-2.91	0	0	0	0	0
520	8	1	7.701	0.074	0	0	0	0
521		2	7.656	0.026	0	0	0	-0.142
522		3	7.61	-0.022	0	0	0	-0.147
523		4	7.565	-0.071	0	0	0	-0.014
524		5	7.52	-0.119	0	0	0	0.257
525	8	1	-1.348	-0.07	0	0	0	0
526		2	-1.303	-0.025	0	0	0	0.13
527		3	-1.257	0.019	0	0	0	0.139
528		4	-1.212	0.063	0	0	0	0.027
529		5	-1.167	0.107	0	0	0	-0.207
530	8	1	7.312	0.119	0	0	0	0.257
531		2	7.267	0.071	0	0	0	-0.014
532		3	7.222	0.022	0	0	0	-0.147
533		4	7.177	-0.026	0	0	0	-0.142
534		5	7.131	-0.074	0	0	0	0
535	8	1	-0.994	-0.107	0	0	0	-0.207
536		2	-0.949	-0.063	0	0	0	0.027
537		3	-0.903	-0.019	0	0	0	0.139
538		4	-0.858	0.025	0	0	0	0.13
539		5	-0.813	0.07	0	0	0	0
540	8	1	-0.801	-0.096	0	0	0	0
541		2	-0.756	-0.048	0	0	0	0.206
542		3	-0.71	0	0	0	0	0.275
543		4	-0.665	0.048	0	0	0	0.206
544		5	-0.62	0.096	0	0	0	0
545	8	1	-0.369	-0.096	0	0	0	0
546		2	-0.324	-0.048	0	0	0	0.206
547		3	-0.279	0	0	0	0	0.275
548		4	-0.234	0.048	0	0	0	0.206
549		5	-0.188	0.096	0	0	0	0
550	8	1	7.519	0.089	0	0	0	0
551		2	7.473	0.044	0	0	0	-0.182
552		3	7.428	0	0	0	0	-0.243
553		4	7.383	-0.044	0	0	0	-0.182
554		5	7.338	-0.089	0	0	0	0
555	8	1	7.127	0.089	0	0	0	0
556		2	7.082	0.044	0	0	0	-0.182
557		3	7.036	0	0	0	0	-0.243
558		4	6.991	-0.044	0	0	0	-0.182
559		5	6.946	-0.089	0	0	0	0
560	9	1	31.21	-0.255	0	0	0	0
561		2	31.21	-0.08	0	0	0	0.642
562		3	31.21	0.095	0	0	0	0.612
563		4	31.21	0.27	0	0	0	-0.088
564		5	31.21	0.445	0	0	0	-1.459
565	9	1	18.661	-0.468	0	0	0	-1.459
566		2	18.661	-0.278	0	0	0	0.096
567		3	18.661	-0.088	0	0	0	0.857
568		4	18.661	0.103	0	0	0	0.825
569		5	18.661	0.293	0	0	0	0
570	9	1	-3.237	-0.253	0	0	0	0
571		2	-3.237	-0.078	0	0	0	0.633
572		3	-3.237	0.097	0	0	0	0.596
573		4	-3.237	0.272	0	0	0	-0.112
574		5	-3.237	0.447	0	0	0	-1.491
575	9	1	9.628	-0.47	0	0	0	-1.491
576		2	9.628	-0.28	0	0	0	0.072
577		3	9.628	-0.089	0	0	0	0.841
578		4	9.628	0.101	0	0	0	0.817
579		5	9.628	0.291	0	0	0	0
580	9	1	-4.904	15.905	0	0	0	0

Member Section Forces (Continued)

LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
581		2	-5.046	7.953	0	0	0	-46.731
582		3	-5.188	0	0	0	0	-62.308
583		4	-5.329	-7.953	0	0	0	-46.731
584		5	-5.471	-15.905	0	0	0	0
585	9	1	-5.333	0	0	0	0	0
586		2	-5.503	0	0	0	0	0
587		3	-5.672	0	0	0	0	0
588		4	-5.842	0	0	0	0	0
589		5	-6.011	0	0	0	0	0
590	9	1	-3.719	0.071	0	0	0	0
591		2	-3.764	0.023	0	0	0	-0.134
592		3	-3.809	-0.025	0	0	0	-0.13
593		4	-3.855	-0.074	0	0	0	0.011
594		5	-3.9	-0.122	0	0	0	0.291
595	9	1	13.934	-0.062	0	0	0	0
596		2	13.979	-0.018	0	0	0	0.11
597		3	14.024	0.026	0	0	0	0.098
598		4	14.069	0.071	0	0	0	-0.035
599		5	14.115	0.115	0	0	0	-0.29
600	9	1	-4.107	0.122	0	0	0	0.291
601		2	-4.153	0.074	0	0	0	0.011
602		3	-4.198	0.025	0	0	0	-0.13
603		4	-4.243	-0.023	0	0	0	-0.134
604		5	-4.288	-0.071	0	0	0	0
605	9	1	14.289	-0.115	0	0	0	-0.29
606		2	14.334	-0.071	0	0	0	-0.035
607		3	14.379	-0.026	0	0	0	0.098
608		4	14.425	0.018	0	0	0	0.11
609		5	14.47	0.062	0	0	0	0
610	9	1	8.524	-0.096	0	0	0	0
611		2	8.569	-0.048	0	0	0	0.206
612		3	8.614	0	0	0	0	0.275
613		4	8.66	0.048	0	0	0	0.206
614		5	8.705	0.096	0	0	0	0
615	9	1	8.961	-0.096	0	0	0	0
616		2	9.006	-0.048	0	0	0	0.206
617		3	9.051	0	0	0	0	0.275
618		4	9.096	0.048	0	0	0	0.206
619		5	9.142	0.096	0	0	0	0
620	9	1	-8.428	0.089	0	0	0	0
621		2	-8.473	0.044	0	0	0	-0.182
622		3	-8.519	0	0	0	0	-0.243
623		4	-8.564	-0.044	0	0	0	-0.182
624		5	-8.609	-0.089	0	0	0	0
625	9	1	-8.833	0.089	0	0	0	0
626		2	-8.878	0.044	0	0	0	-0.182
627		3	-8.923	0	0	0	0	-0.243
628		4	-8.969	-0.044	0	0	0	-0.182
629		5	-9.014	-0.089	0	0	0	0
630	10	1	-2.975	-0.26	0	0	0	0
631		2	-2.975	-0.085	0	0	0	0.66
632		3	-2.975	0.09	0	0	0	0.649
633		4	-2.975	0.265	0	0	0	-0.033
634		5	-2.975	0.44	0	0	0	-1.386
635	10	1	2.48	-0.464	0	0	0	-1.386
636		2	2.48	-0.273	0	0	0	0.151
637		3	2.48	-0.083	0	0	0	0.894
638		4	2.48	0.107	0	0	0	0.844
639		5	2.48	0.298	0	0	0	0
640	10	1	14.632	-0.258	0	0	0	0
641		2	14.632	-0.083	0	0	0	0.655
642		3	14.632	0.092	0	0	0	0.639
643		4	14.632	0.267	0	0	0	-0.047
644		5	14.632	0.442	0	0	0	-1.404
645	10	1	8.556	-0.465	0	0	0	-1.404
646		2	8.556	-0.275	0	0	0	0.137
647		3	8.556	-0.084	0	0	0	0.884
648		4	8.556	0.106	0	0	0	0.839

Member Section Forces (Continued)

LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
649		5	8.556	0.296	0	0	0	0
650	10	1	2.628	6.816	0	0	0	0
651		2	2.486	3.408	0	0	0	-20.028
652		3	2.345	0	0	0	0	-26.703
653		4	2.203	-3.408	0	0	0	-20.028
654		5	2.062	-6.816	0	0	0	0
655	10	1	0.107	0	0	0	0	0
656		2	-0.063	0	0	0	0	0
657		3	-0.232	0	0	0	0	0
658		4	-0.402	0	0	0	0	0
659		5	-0.572	0	0	0	0	0
660	10	1	6.019	0.074	0	0	0	0
661		2	5.973	0.026	0	0	0	-0.142
662		3	5.928	-0.023	0	0	0	-0.146
663		4	5.883	-0.071	0	0	0	-0.013
664		5	5.838	-0.119	0	0	0	0.258
665	10	1	-3.01	-0.069	0	0	0	0
666		2	-2.964	-0.025	0	0	0	0.129
667		3	-2.919	0.019	0	0	0	0.137
668		4	-2.874	0.064	0	0	0	0.024
669		5	-2.829	0.108	0	0	0	-0.211
670	10	1	5.63	0.119	0	0	0	0.258
671		2	5.585	0.071	0	0	0	-0.013
672		3	5.54	0.023	0	0	0	-0.146
673		4	5.494	-0.026	0	0	0	-0.142
674		5	5.449	-0.074	0	0	0	0
675	10	1	-2.656	-0.108	0	0	0	-0.211
676		2	-2.61	-0.064	0	0	0	0.024
677		3	-2.565	-0.019	0	0	0	0.137
678		4	-2.52	0.025	0	0	0	0.129
679		5	-2.475	0.069	0	0	0	0
680	10	1	-2.477	-0.096	0	0	0	0
681		2	-2.432	-0.048	0	0	0	0.206
682		3	-2.387	0	0	0	0	0.275
683		4	-2.342	0.048	0	0	0	0.206
684		5	-2.296	0.096	0	0	0	0
685	10	1	-2.046	-0.096	0	0	0	0
686		2	-2.001	-0.048	0	0	0	0.206
687		3	-1.955	0	0	0	0	0.275
688		4	-1.91	0.048	0	0	0	0.206
689		5	-1.865	0.096	0	0	0	0
690	10	1	5.853	0.089	0	0	0	0
691		2	5.808	0.044	0	0	0	-0.182
692		3	5.763	0	0	0	0	-0.243
693		4	5.717	-0.044	0	0	0	-0.182
694		5	5.672	-0.089	0	0	0	0
695	10	1	5.461	0.089	0	0	0	0
696		2	5.416	0.044	0	0	0	-0.182
697		3	5.37	0	0	0	0	-0.243
698		4	5.325	-0.044	0	0	0	-0.182
699		5	5.28	-0.089	0	0	0	0
700	11	1	23.274	-0.254	0	0	0	0
701		2	23.274	-0.079	0	0	0	0.639
702		3	23.274	0.096	0	0	0	0.607
703		4	23.274	0.271	0	0	0	-0.095
704		5	23.274	0.446	0	0	0	-1.469
705	11	1	10.792	-0.469	0	0	0	-1.469
706		2	10.792	-0.278	0	0	0	0.088
707		3	10.792	-0.088	0	0	0	0.852
708		4	10.792	0.102	0	0	0	0.823
709		5	10.792	0.293	0	0	0	0
710	11	1	-11.151	-0.253	0	0	0	0
711		2	-11.151	-0.078	0	0	0	0.636
712		3	-11.151	0.097	0	0	0	0.601
713		4	-11.151	0.272	0	0	0	-0.104
714		5	-11.151	0.447	0	0	0	-1.481
715	11	1	1.767	-0.47	0	0	0	-1.481
716		2	1.767	-0.279	0	0	0	0.079

Member Section Forces (Continued)

LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
717		3	1.767	-0.089	0	0	0	0.846
718		4	1.767	0.102	0	0	0	0.82
719		5	1.767	0.292	0	0	0	0
720	11	1	-3.753	6.816	0	0	0	0
721		2	-3.895	3.408	0	0	0	-20.028
722		3	-4.037	0	0	0	0	-26.703
723		4	-4.178	-3.408	0	0	0	-20.028
724		5	-4.32	-6.816	0	0	0	0
725	11	1	-2.995	0	0	0	0	0
726		2	-3.165	0	0	0	0	0
727		3	-3.334	0	0	0	0	0
728		4	-3.504	0	0	0	0	0
729		5	-3.673	0	0	0	0	0
730	11	1	-5.393	0.071	0	0	0	0
731		2	-5.438	0.023	0	0	0	-0.133
732		3	-5.483	-0.026	0	0	0	-0.129
733		4	-5.529	-0.074	0	0	0	0.013
734		5	-5.574	-0.122	0	0	0	0.292
735	11	1	12.265	-0.062	0	0	0	0
736		2	12.31	-0.017	0	0	0	0.109
737		3	12.355	0.027	0	0	0	0.096
738		4	12.401	0.071	0	0	0	-0.038
739		5	12.446	0.115	0	0	0	-0.294
740	11	1	-5.782	0.122	0	0	0	0.292
741		2	-5.827	0.074	0	0	0	0.013
742		3	-5.872	0.026	0	0	0	-0.129
743		4	-5.917	-0.023	0	0	0	-0.133
744		5	-5.963	-0.071	0	0	0	0
745	11	1	12.62	-0.115	0	0	0	-0.294
746		2	12.666	-0.071	0	0	0	-0.038
747		3	12.711	-0.027	0	0	0	0.096
748		4	12.756	0.017	0	0	0	0.109
749		5	12.801	0.062	0	0	0	0
750	11	1	6.839	-0.096	0	0	0	0
751		2	6.884	-0.048	0	0	0	0.206
752		3	6.93	0	0	0	0	0.275
753		4	6.975	0.048	0	0	0	0.206
754		5	7.02	0.096	0	0	0	0
755	11	1	7.276	-0.096	0	0	0	0
756		2	7.322	-0.048	0	0	0	0.206
757		3	7.367	0	0	0	0	0.275
758		4	7.412	0.048	0	0	0	0.206
759		5	7.457	0.096	0	0	0	0
760	11	1	-10.087	0.089	0	0	0	0
761		2	-10.132	0.044	0	0	0	-0.182
762		3	-10.177	0	0	0	0	-0.243
763		4	-10.222	-0.044	0	0	0	-0.182
764		5	-10.268	-0.089	0	0	0	0
765	11	1	-10.492	0.089	0	0	0	0
766		2	-10.537	0.044	0	0	0	-0.182
767		3	-10.583	0	0	0	0	-0.243
768		4	-10.628	-0.044	0	0	0	-0.182
769		5	-10.673	-0.089	0	0	0	0
770	12	1	-11.944	-0.263	0	0	0	0
771		2	-11.944	-0.088	0	0	0	0.672
772		3	-11.944	0.087	0	0	0	0.672
773		4	-11.944	0.262	0	0	0	0.002
774		5	-11.944	0.437	0	0	0	-1.339
775	12	1	0.793	-0.461	0	0	0	-1.339
776		2	0.793	-0.271	0	0	0	0.186
777		3	0.793	-0.08	0	0	0	0.917
778		4	0.793	0.11	0	0	0	0.855
779		5	0.793	0.3	0	0	0	0
780	12	1	31.695	-0.261	0	0	0	0
781		2	31.695	-0.086	0	0	0	0.664
782		3	31.695	0.089	0	0	0	0.656
783		4	31.695	0.264	0	0	0	-0.022
784		5	31.695	0.44	0	0	0	-1.371

Member Section Forces (Continued)

LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
785	12	M5	1	14.426	-0.463	0	0	-1.371
786			2	14.426	-0.273	0	0	0.162
787			3	14.426	-0.082	0	0	0.901
788			4	14.426	0.108	0	0	0.847
789			5	14.426	0.298	0	0	0
790	12	M6	1	5.475	9.657	0	0	0
791			2	5.334	4.828	0	0	-28.372
792			3	5.192	0	0	0	-37.83
793			4	5.051	-4.828	0	0	-28.372
794			5	4.909	-9.657	0	0	0
795	12	M10	1	0.669	1.959	0	0	0
796			2	0.5	0.979	0	0	-5.755
797			3	0.33	0	0	0	-7.673
798			4	0.161	-0.979	0	0	-5.755
799			5	-0.009	-1.959	0	0	0
800	12	M7	1	12.227	0.075	0	0	0
801			2	12.182	0.027	0	0	-0.146
802			3	12.137	-0.021	0	0	-0.155
803			4	12.092	-0.069	0	0	-0.026
804			5	12.046	-0.117	0	0	0.241
805	12	M8	1	-9.747	-0.073	0	0	0
806			2	-9.702	-0.029	0	0	0.14
807			3	-9.657	0.015	0	0	0.159
808			4	-9.612	0.06	0	0	0.056
809			5	-9.566	0.104	0	0	-0.168
810	12	M9	1	11.839	0.117	0	0	0.241
811			2	11.794	0.069	0	0	-0.026
812			3	11.749	0.021	0	0	-0.155
813			4	11.704	-0.027	0	0	-0.146
814			5	11.658	-0.075	0	0	0
815	12	M11	1	-9.389	-0.104	0	0	-0.168
816			2	-9.344	-0.06	0	0	0.056
817			3	-9.299	-0.015	0	0	0.159
818			4	-9.254	0.029	0	0	0.14
819			5	-9.208	0.073	0	0	0
820	12	M12	1	-6.637	-0.096	0	0	0
821			2	-6.592	-0.048	0	0	0.206
822			3	-6.547	0	0	0	0.275
823			4	-6.501	0.048	0	0	0.206
824			5	-6.456	0.096	0	0	0
825	12	M13	1	-6.207	-0.096	0	0	0
826			2	-6.162	-0.048	0	0	0.206
827			3	-6.117	0	0	0	0.275
828			4	-6.072	0.048	0	0	0.206
829			5	-6.026	0.096	0	0	0
830	12	M14	1	14.728	0.089	0	0	0
831			2	14.683	0.044	0	0	-0.182
832			3	14.638	0	0	0	-0.243
833			4	14.593	-0.044	0	0	-0.182
834			5	14.547	-0.089	0	0	0
835	12	M15	1	14.346	0.089	0	0	0
836			2	14.301	0.044	0	0	-0.182
837			3	14.256	0	0	0	-0.243
838			4	14.211	-0.044	0	0	-0.182
839			5	14.165	-0.089	0	0	0
840	13	M1	1	40.565	-0.252	0	0	0
841			2	40.565	-0.077	0	0	0.63
842			3	40.565	0.098	0	0	0.589
843			4	40.565	0.273	0	0	-0.123
844			5	40.565	0.448	0	0	-1.506
845	13	M2	1	17.419	-0.471	0	0	-1.506
846			2	17.419	-0.281	0	0	0.061
847			3	17.419	-0.09	0	0	0.834
848			4	17.419	0.1	0	0	0.813
849			5	17.419	0.29	0	0	0
850	13	M4	1	-19.882	-0.251	0	0	0
851			2	-19.882	-0.076	0	0	0.625
852			3	-19.882	0.099	0	0	0.58

Member Section Forces (Continued)

LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
853		4	-19.882	0.274	0	0	0	-0.137
854		5	-19.882	0.449	0	0	0	-1.524
855	13	1	0.846	-0.472	0	0	0	-1.524
856		2	0.846	-0.282	0	0	0	0.047
857		3	0.846	-0.091	0	0	0	0.825
858		4	0.846	0.099	0	0	0	0.809
859		5	0.846	0.289	0	0	0	0
860	13	1	-7.288	9.657	0	0	0	0
861		2	-7.429	4.828	0	0	0	-28.372
862		3	-7.571	0	0	0	0	-37.83
863		4	-7.713	-4.828	0	0	0	-28.372
864		5	-7.854	-9.657	0	0	0	0
865	13	1	-5.534	1.959	0	0	0	0
866		2	-5.704	0.979	0	0	0	-5.755
867		3	-5.873	0	0	0	0	-7.673
868		4	-6.043	-0.979	0	0	0	-5.755
869		5	-6.212	-1.959	0	0	0	0
870	13	1	-10.601	0.069	0	0	0	0
871		2	-10.646	0.021	0	0	0	-0.13
872		3	-10.691	-0.027	0	0	0	-0.121
873		4	-10.737	-0.075	0	0	0	0.024
874		5	-10.782	-0.123	0	0	0	0.308
875	13	1	20.809	-0.058	0	0	0	0
876		2	20.854	-0.014	0	0	0	0.099
877		3	20.9	0.03	0	0	0	0.076
878		4	20.945	0.075	0	0	0	-0.068
879		5	20.99	0.119	0	0	0	-0.333
880	13	1	-10.989	0.123	0	0	0	0.308
881		2	-11.034	0.075	0	0	0	0.024
882		3	-11.08	0.027	0	0	0	-0.121
883		4	-11.125	-0.021	0	0	0	-0.13
884		5	-11.17	-0.069	0	0	0	0
885	13	1	21.169	-0.119	0	0	0	-0.333
886		2	21.215	-0.075	0	0	0	-0.068
887		3	21.26	-0.03	0	0	0	0.076
888		4	21.305	0.014	0	0	0	0.099
889		5	21.35	0.058	0	0	0	0
890	13	1	12.001	-0.096	0	0	0	0
891		2	12.046	-0.048	0	0	0	0.206
892		3	12.091	0	0	0	0	0.275
893		4	12.136	0.048	0	0	0	0.206
894		5	12.182	0.096	0	0	0	0
895	13	1	12.442	-0.096	0	0	0	0
896		2	12.487	-0.048	0	0	0	0.206
897		3	12.532	0	0	0	0	0.275
898		4	12.577	0.048	0	0	0	0.206
899		5	12.623	0.096	0	0	0	0
900	13	1	-17.159	0.089	0	0	0	0
901		2	-17.204	0.044	0	0	0	-0.182
902		3	-17.249	0	0	0	0	-0.243
903		4	-17.295	-0.044	0	0	0	-0.182
904		5	-17.34	-0.089	0	0	0	0
905	13	1	-17.567	0.089	0	0	0	0
906		2	-17.612	0.044	0	0	0	-0.182
907		3	-17.657	0	0	0	0	-0.243
908		4	-17.702	-0.044	0	0	0	-0.182
909		5	-17.748	-0.089	0	0	0	0
910	14	1	-14.417	-0.263	0	0	0	0
911		2	-14.417	-0.087	0	0	0	0.671
912		3	-14.417	0.088	0	0	0	0.671
913		4	-14.417	0.263	0	0	0	0
914		5	-14.417	0.438	0	0	0	-1.342
915	14	1	-1.663	-0.461	0	0	0	-1.342
916		2	-1.663	-0.271	0	0	0	0.183
917		3	-1.663	-0.081	0	0	0	0.915
918		4	-1.663	0.11	0	0	0	0.854
919		5	-1.663	0.3	0	0	0	0
920	14	1	29.214	-0.261	0	0	0	0

Member Section Forces (Continued)

LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
921		2	29.214	-0.086	0	0	0	0.664
922		3	29.214	0.089	0	0	0	0.658
923		4	29.214	0.264	0	0	0	-0.02
924		5	29.214	0.439	0	0	0	-1.368
925	14	1	11.967	-0.463	0	0	0	-1.368
926		2	11.967	-0.272	0	0	0	0.164
927		3	11.967	-0.082	0	0	0	0.903
928		4	11.967	0.108	0	0	0	0.848
929		5	11.967	0.299	0	0	0	0
930	14	1	5.835	6.816	0	0	0	0
931		2	5.693	3.408	0	0	0	-20.028
932		3	5.552	0	0	0	0	-26.703
933		4	5.41	-3.408	0	0	0	-20.028
934		5	5.269	-6.816	0	0	0	0
935	14	1	1.4	1.959	0	0	0	0
936		2	1.23	0.979	0	0	0	-5.755
937		3	1.061	0	0	0	0	-7.673
938		4	0.891	-0.979	0	0	0	-5.755
939		5	0.722	-1.959	0	0	0	0
940	14	1	11.7	0.075	0	0	0	0
941		2	11.655	0.027	0	0	0	-0.146
942		3	11.61	-0.021	0	0	0	-0.155
943		4	11.565	-0.069	0	0	0	-0.026
944		5	11.519	-0.117	0	0	0	0.241
945	14	1	-10.266	-0.073	0	0	0	0
946		2	-10.22	-0.029	0	0	0	0.14
947		3	-10.175	0.015	0	0	0	0.158
948		4	-10.13	0.06	0	0	0	0.055
949		5	-10.085	0.104	0	0	0	-0.169
950	14	1	11.312	0.117	0	0	0	0.241
951		2	11.267	0.069	0	0	0	-0.026
952		3	11.222	0.021	0	0	0	-0.155
953		4	11.177	-0.027	0	0	0	-0.146
954		5	11.131	-0.075	0	0	0	0
955	14	1	-9.908	-0.104	0	0	0	-0.169
956		2	-9.862	-0.06	0	0	0	0.055
957		3	-9.817	-0.015	0	0	0	0.158
958		4	-9.772	0.029	0	0	0	0.14
959		5	-9.727	0.073	0	0	0	0
960	14	1	-7.16	-0.096	0	0	0	0
961		2	-7.115	-0.048	0	0	0	0.206
962		3	-7.069	0	0	0	0	0.275
963		4	-7.024	0.048	0	0	0	0.206
964		5	-6.979	0.096	0	0	0	0
965	14	1	-6.73	-0.096	0	0	0	0
966		2	-6.685	-0.048	0	0	0	0.206
967		3	-6.64	0	0	0	0	0.275
968		4	-6.594	0.048	0	0	0	0.206
969		5	-6.549	0.096	0	0	0	0
970	14	1	14.207	0.089	0	0	0	0
971		2	14.161	0.044	0	0	0	-0.182
972		3	14.116	0	0	0	0	-0.243
973		4	14.071	-0.044	0	0	0	-0.182
974		5	14.026	-0.089	0	0	0	0
975	14	1	13.825	0.089	0	0	0	0
976		2	13.779	0.044	0	0	0	-0.182
977		3	13.734	0	0	0	0	-0.243
978		4	13.689	-0.044	0	0	0	-0.182
979		5	13.644	-0.089	0	0	0	0
980	15	1	38.082	-0.252	0	0	0	0
981		2	38.082	-0.077	0	0	0	0.629
982		3	38.082	0.098	0	0	0	0.587
983		4	38.082	0.273	0	0	0	-0.125
984		5	38.082	0.449	0	0	0	-1.509
985	15	1	14.959	-0.471	0	0	0	-1.509
986		2	14.959	-0.281	0	0	0	0.058
987		3	14.959	-0.091	0	0	0	0.832
988		4	14.959	0.1	0	0	0	0.813

Member Section Forces (Continued)

LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
989		5	14.959	0.29	0	0	0	0
990	15	1	-22.353	-0.251	0	0	0	0
991		2	-22.353	-0.076	0	0	0	0.626
992		3	-22.353	0.099	0	0	0	0.581
993		4	-22.353	0.274	0	0	0	-0.134
994		5	-22.353	0.449	0	0	0	-1.521
995	15	1	-1.61	-0.472	0	0	0	-1.521
996		2	-1.61	-0.282	0	0	0	0.049
997		3	-1.61	-0.091	0	0	0	0.826
998		4	-1.61	0.099	0	0	0	0.81
999		5	-1.61	0.289	0	0	0	0
1000	15	1	-6.928	6.816	0	0	0	0
1001		2	-7.07	3.408	0	0	0	-20.028
1002		3	-7.211	0	0	0	0	-26.703
1003		4	-7.353	-3.408	0	0	0	-20.028
1004		5	-7.494	-6.816	0	0	0	0
1005	15	1	-4.803	1.959	0	0	0	0
1006		2	-4.973	0.979	0	0	0	-5.755
1007		3	-5.142	0	0	0	0	-7.673
1008		4	-5.312	-0.979	0	0	0	-5.755
1009		5	-5.482	-1.959	0	0	0	0
1010	15	1	-11.123	0.069	0	0	0	0
1011		2	-11.168	0.021	0	0	0	-0.129
1012		3	-11.213	-0.027	0	0	0	-0.121
1013		4	-11.258	-0.075	0	0	0	0.025
1014		5	-11.304	-0.123	0	0	0	0.308
1015	15	1	20.287	-0.058	0	0	0	0
1016		2	20.332	-0.014	0	0	0	0.098
1017		3	20.377	0.031	0	0	0	0.075
1018		4	20.422	0.075	0	0	0	-0.069
1019		5	20.467	0.119	0	0	0	-0.335
1020	15	1	-11.511	0.123	0	0	0	0.308
1021		2	-11.556	0.075	0	0	0	0.025
1022		3	-11.602	0.027	0	0	0	-0.121
1023		4	-11.647	-0.021	0	0	0	-0.129
1024		5	-11.692	-0.069	0	0	0	0
1025	15	1	20.647	-0.119	0	0	0	-0.335
1026		2	20.692	-0.075	0	0	0	-0.069
1027		3	20.737	-0.031	0	0	0	0.075
1028		4	20.783	0.014	0	0	0	0.098
1029		5	20.828	0.058	0	0	0	0
1030	15	1	11.473	-0.096	0	0	0	0
1031		2	11.518	-0.048	0	0	0	0.206
1032		3	11.563	0	0	0	0	0.275
1033		4	11.609	0.048	0	0	0	0.206
1034		5	11.654	0.096	0	0	0	0
1035	15	1	11.914	-0.096	0	0	0	0
1036		2	11.959	-0.048	0	0	0	0.206
1037		3	12.004	0	0	0	0	0.275
1038		4	12.05	0.048	0	0	0	0.206
1039		5	12.095	0.096	0	0	0	0
1040	15	1	-17.676	0.089	0	0	0	0
1041		2	-17.721	0.044	0	0	0	-0.182
1042		3	-17.767	0	0	0	0	-0.243
1043		4	-17.812	-0.044	0	0	0	-0.182
1044		5	-17.857	-0.089	0	0	0	0
1045	15	1	-18.084	0.089	0	0	0	0
1046		2	-18.129	0.044	0	0	0	-0.182
1047		3	-18.175	0	0	0	0	-0.243
1048		4	-18.22	-0.044	0	0	0	-0.182
1049		5	-18.265	-0.089	0	0	0	0
1050	16	1	-18.641	-0.198	0	0	0	0
1051		2	-18.641	-0.067	0	0	0	0.508
1052		3	-18.641	0.064	0	0	0	0.513
1053		4	-18.641	0.196	0	0	0	0.014
1054		5	-18.641	0.327	0	0	0	-0.987
1055	16	1	-3.339	-0.345	0	0	0	-0.987
1056		2	-3.339	-0.202	0	0	0	0.152

Member Section Forces (Continued)

LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1057		3	-3.339	-0.059	0	0	0	0.696
1058		4	-3.339	0.084	0	0	0	0.646
1059		5	-3.339	0.226	0	0	0	0
1060	16	1	27.086	-0.197	0	0	0	0
1061		2	27.086	-0.066	0	0	0	0.503
1062		3	27.086	0.066	0	0	0	0.504
1063		4	27.086	0.197	0	0	0	0.001
1064		5	27.086	0.328	0	0	0	-1.006
1065	16	1	10.659	-0.346	0	0	0	-1.006
1066		2	10.659	-0.203	0	0	0	0.138
1067		3	10.659	-0.06	0	0	0	0.687
1068		4	10.659	0.082	0	0	0	0.641
1069		5	10.659	0.225	0	0	0	0
1070	16	1	5.96	5.112	0	0	0	0
1071		2	5.853	2.556	0	0	0	-15.021
1072		3	5.747	0	0	0	0	-20.028
1073		4	5.641	-2.556	0	0	0	-15.021
1074		5	5.535	-5.112	0	0	0	0
1075	16	1	2.02	0	0	0	0	0
1076		2	1.893	0	0	0	0	0
1077		3	1.766	0	0	0	0	0
1078		4	1.639	0	0	0	0	0
1079		5	1.511	0	0	0	0	0
1080	16	1	11.644	0.057	0	0	0	0
1081		2	11.61	0.021	0	0	0	-0.112
1082		3	11.576	-0.015	0	0	0	-0.12
1083		4	11.542	-0.051	0	0	0	-0.025
1084		5	11.508	-0.087	0	0	0	0.173
1085	16	1	-11.806	-0.057	0	0	0	0
1086		2	-11.772	-0.023	0	0	0	0.11
1087		3	-11.738	0.01	0	0	0	0.129
1088		4	-11.704	0.043	0	0	0	0.057
1089		5	-11.67	0.076	0	0	0	-0.107
1090	16	1	11.353	0.087	0	0	0	0.173
1091		2	11.319	0.051	0	0	0	-0.025
1092		3	11.285	0.015	0	0	0	-0.12
1093		4	11.251	-0.021	0	0	0	-0.112
1094		5	11.218	-0.057	0	0	0	0
1095	16	1	-11.536	-0.076	0	0	0	-0.107
1096		2	-11.502	-0.043	0	0	0	0.057
1097		3	-11.468	-0.01	0	0	0	0.129
1098		4	-11.434	0.023	0	0	0	0.11
1099		5	-11.4	0.057	0	0	0	0
1100	16	1	-7.68	-0.072	0	0	0	0
1101		2	-7.646	-0.036	0	0	0	0.155
1102		3	-7.613	0	0	0	0	0.206
1103		4	-7.579	0.036	0	0	0	0.155
1104		5	-7.545	0.072	0	0	0	0
1105	16	1	-7.359	-0.072	0	0	0	0
1106		2	-7.325	-0.036	0	0	0	0.155
1107		3	-7.291	0	0	0	0	0.206
1108		4	-7.257	0.036	0	0	0	0.155
1109		5	-7.223	0.072	0	0	0	0
1110	16	1	14.348	0.066	0	0	0	0
1111		2	14.314	0.033	0	0	0	-0.136
1112		3	14.28	0	0	0	0	-0.182
1113		4	14.246	-0.033	0	0	0	-0.136
1114		5	14.212	-0.066	0	0	0	0
1115	16	1	14.066	0.066	0	0	0	0
1116		2	14.033	0.033	0	0	0	-0.136
1117		3	13.999	0	0	0	0	-0.182
1118		4	13.965	-0.033	0	0	0	-0.136
1119		5	13.931	-0.066	0	0	0	0
1120	17	1	33.851	-0.187	0	0	0	0
1121		2	33.851	-0.056	0	0	0	0.466
1122		3	33.851	0.075	0	0	0	0.43
1123		4	33.851	0.207	0	0	0	-0.11
1124		5	33.851	0.338	0	0	0	-1.154

Member Section Forces (Continued)

LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1125	17	M2	1	13.282	-0.355	0	0	-1.154
1126			2	13.282	-0.212	0	0	0.027
1127			3	13.282	-0.069	0	0	0.613
1128			4	13.282	0.074	0	0	0.604
1129			5	13.282	0.216	0	0	0
1130	17	M4	1	-24.472	-0.187	0	0	0
1131			2	-24.472	-0.056	0	0	0.465
1132			3	-24.472	0.076	0	0	0.427
1133			4	-24.472	0.207	0	0	-0.114
1134			5	-24.472	0.338	0	0	-1.158
1135	17	M5	1	-2.916	-0.355	0	0	-1.158
1136			2	-2.916	-0.212	0	0	0.024
1137			3	-2.916	-0.069	0	0	0.611
1138			4	-2.916	0.073	0	0	0.603
1139			5	-2.916	0.216	0	0	0
1140	17	M6	1	-6.803	5.112	0	0	0
1141			2	-6.909	2.556	0	0	-15.021
1142			3	-7.016	0	0	0	-20.028
1143			4	-7.122	-2.556	0	0	-15.021
1144			5	-7.228	-5.112	0	0	0
1145	17	M10	1	-4.183	0	0	0	0
1146			2	-4.31	0	0	0	0
1147			3	-4.438	0	0	0	0
1148			4	-4.565	0	0	0	0
1149			5	-4.692	0	0	0	0
1150	17	M7	1	-11.176	0.051	0	0	0
1151			2	-11.21	0.015	0	0	-0.095
1152			3	-11.244	-0.021	0	0	-0.086
1153			4	-11.278	-0.057	0	0	0.025
1154			5	-11.312	-0.093	0	0	0.24
1155	17	M8	1	18.741	-0.042	0	0	0
1156			2	18.775	-0.008	0	0	0.068
1157			3	18.809	0.025	0	0	0.046
1158			4	18.843	0.058	0	0	-0.068
1159			5	18.877	0.091	0	0	-0.272
1160	17	M9	1	-11.467	0.093	0	0	0.24
1161			2	-11.501	0.057	0	0	0.025
1162			3	-11.535	0.021	0	0	-0.086
1163			4	-11.569	-0.015	0	0	-0.095
1164			5	-11.603	-0.051	0	0	0
1165	17	M11	1	19.013	-0.091	0	0	-0.272
1166			2	19.047	-0.058	0	0	-0.068
1167			3	19.081	-0.025	0	0	0.046
1168			4	19.115	0.008	0	0	0.068
1169			5	19.149	0.042	0	0	0
1170	17	M12	1	10.949	-0.072	0	0	0
1171			2	10.983	-0.036	0	0	0.155
1172			3	11.017	0	0	0	0.206
1173			4	11.051	0.036	0	0	0.155
1174			5	11.085	0.072	0	0	0
1175	17	M13	1	11.282	-0.072	0	0	0
1176			2	11.316	-0.036	0	0	0.155
1177			3	11.35	0	0	0	0.206
1178			4	11.384	0.036	0	0	0.155
1179			5	11.418	0.072	0	0	0
1180	17	M14	1	-17.528	0.066	0	0	0
1181			2	-17.562	0.033	0	0	-0.136
1182			3	-17.596	0	0	0	-0.182
1183			4	-17.63	-0.033	0	0	-0.136
1184			5	-17.664	-0.066	0	0	0
1185	17	M15	1	-17.837	0.066	0	0	0
1186			2	-17.871	0.033	0	0	-0.136
1187			3	-17.905	0	0	0	-0.182
1188			4	-17.939	-0.033	0	0	-0.136
1189			5	-17.973	-0.066	0	0	0
1190	18	M1	1	8.46	-0.214	0	0	0
1191			2	8.46	-0.068	0	0	0.541
1192			3	8.46	0.078	0	0	0.523

Member Section Forces (Continued)

LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1193		4	8.46	0.223	0	0	0	-0.053
1194		5	8.46	0.369	0	0	0	-1.189
1195	18	1	5.531	-0.389	0	0	0	-1.189
1196		2	5.531	-0.23	0	0	0	0.1
1197		3	5.531	-0.071	0	0	0	0.727
1198		4	5.531	0.087	0	0	0	0.694
1199		5	5.531	0.246	0	0	0	0
1200	18	1	1.45	-0.213	0	0	0	0
1201		2	1.45	-0.067	0	0	0	0.538
1202		3	1.45	0.078	0	0	0	0.517
1203		4	1.45	0.224	0	0	0	-0.063
1204		5	1.45	0.37	0	0	0	-1.202
1205	18	1	4.301	-0.389	0	0	0	-1.202
1206		2	4.301	-0.231	0	0	0	0.09
1207		3	4.301	-0.072	0	0	0	0.721
1208		4	4.301	0.086	0	0	0	0.691
1209		5	4.301	0.245	0	0	0	0
1210	18	1	-0.469	5.68	0	0	0	0
1211		2	-0.587	2.84	0	0	0	-16.69
1212		3	-0.705	0	0	0	0	-22.253
1213		4	-0.823	-2.84	0	0	0	-16.69
1214		5	-0.941	-5.68	0	0	0	0
1215	18	1	-1.204	0	0	0	0	0
1216		2	-1.345	0	0	0	0	0
1217		3	-1.486	0	0	0	0	0
1218		4	-1.628	0	0	0	0	0
1219		5	-1.769	0	0	0	0	0
1220	18	1	0.261	0.06	0	0	0	0
1221		2	0.223	0.02	0	0	0	-0.115
1222		3	0.186	-0.02	0	0	0	-0.115
1223		4	0.148	-0.06	0	0	0	0
1224		5	0.11	-0.1	0	0	0	0.229
1225	18	1	3.857	-0.055	0	0	0	0
1226		2	3.895	-0.018	0	0	0	0.099
1227		3	3.932	0.019	0	0	0	0.097
1228		4	3.97	0.056	0	0	0	-0.006
1229		5	4.008	0.093	0	0	0	-0.21
1230	18	1	-0.063	0.1	0	0	0	0.229
1231		2	-0.101	0.06	0	0	0	0
1232		3	-0.138	0.02	0	0	0	-0.115
1233		4	-0.176	-0.02	0	0	0	-0.115
1234		5	-0.214	-0.06	0	0	0	0
1235	18	1	4.151	-0.093	0	0	0	-0.21
1236		2	4.189	-0.056	0	0	0	-0.006
1237		3	4.227	-0.019	0	0	0	0.097
1238		4	4.264	0.018	0	0	0	0.099
1239		5	4.302	0.055	0	0	0	0
1240	18	1	1.818	-0.08	0	0	0	0
1241		2	1.855	-0.04	0	0	0	0.172
1242		3	1.893	0	0	0	0	0.229
1243		4	1.931	0.04	0	0	0	0.172
1244		5	1.968	0.08	0	0	0	0
1245	18	1	2.179	-0.08	0	0	0	0
1246		2	2.217	-0.04	0	0	0	0.172
1247		3	2.255	0	0	0	0	0.229
1248		4	2.292	0.04	0	0	0	0.172
1249		5	2.33	0.08	0	0	0	0
1250	18	1	-1.763	0.074	0	0	0	0
1251		2	-1.801	0.037	0	0	0	-0.152
1252		3	-1.839	0	0	0	0	-0.202
1253		4	-1.876	-0.037	0	0	0	-0.152
1254		5	-1.914	-0.074	0	0	0	0
1255	18	1	-2.097	0.074	0	0	0	0
1256		2	-2.134	0.037	0	0	0	-0.152
1257		3	-2.172	0	0	0	0	-0.202
1258		4	-2.21	-0.037	0	0	0	-0.152
1259		5	-2.247	-0.074	0	0	0	0
1260	19	1	3.379	0	0	0	0	0

Member Section Forces (Continued)

LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1261		2	3.379	0	0	0	0	0.001
1262		3	3.379	0	0	0	0	0.002
1263		4	3.379	0	0	0	0	0.002
1264		5	3.379	0	0	0	0	0.003
1265	19	1	0.034	0	0	0	0	0.003
1266		2	0.034	0	0	0	0	0.002
1267		3	0.034	0	0	0	0	0.002
1268		4	0.034	0	0	0	0	0.001
1269		5	0.034	0	0	0	0	0
1270	19	1	3.379	0	0	0	0	0
1271		2	3.379	0	0	0	0	-0.001
1272		3	3.379	0	0	0	0	-0.002
1273		4	3.379	0	0	0	0	-0.002
1274		5	3.379	0	0	0	0	-0.003
1275	19	1	0.034	0	0	0	0	-0.003
1276		2	0.034	0	0	0	0	-0.002
1277		3	0.034	0	0	0	0	-0.002
1278		4	0.034	0	0	0	0	-0.001
1279		5	0.034	0	0	0	0	0
1280	19	1	0.032	0	0	0	0	0
1281		2	0.032	0	0	0	0	0
1282		3	0.032	0	0	0	0	0
1283		4	0.032	0	0	0	0	0
1284		5	0.032	0	0	0	0	0
1285	19	1	-0.518	3.917	0	0	0	0
1286		2	-0.518	1.959	0	0	0	-11.51
1287		3	-0.518	0	0	0	0	-15.347
1288		4	-0.518	-1.959	0	0	0	-11.51
1289		5	-0.518	-3.918	0	0	0	0
1290	19	1	-0.047	0	0	0	0	0
1291		2	-0.047	0	0	0	0	0
1292		3	-0.047	0	0	0	0	0
1293		4	-0.047	0	0	0	0	-0.001
1294		5	-0.047	0	0	0	0	-0.001
1295	19	1	0.77	0	0	0	0	0
1296		2	0.77	0	0	0	0	0
1297		3	0.77	0	0	0	0	0
1298		4	0.77	0	0	0	0	0.001
1299		5	0.77	0	0	0	0	0.001
1300	19	1	-0.047	0	0	0	0	-0.001
1301		2	-0.047	0	0	0	0	-0.001
1302		3	-0.047	0	0	0	0	0
1303		4	-0.047	0	0	0	0	0
1304		5	-0.047	0	0	0	0	0
1305	19	1	0.77	0	0	0	0	0.001
1306		2	0.77	0	0	0	0	0.001
1307		3	0.77	0	0	0	0	0
1308		4	0.77	0	0	0	0	0
1309		5	0.77	0	0	0	0	0
1310	19	1	-0.047	0	0	0	0	0
1311		2	-0.047	0	0	0	0	0
1312		3	-0.047	0	0	0	0	0
1313		4	-0.047	0	0	0	0	0
1314		5	-0.047	0	0	0	0	0
1315	19	1	-0.047	0	0	0	0	0
1316		2	-0.047	0	0	0	0	0
1317		3	-0.047	0	0	0	0	0
1318		4	-0.047	0	0	0	0	0
1319		5	-0.047	0	0	0	0	0
1320	19	1	0.77	0	0	0	0	0
1321		2	0.77	0	0	0	0	0
1322		3	0.77	0	0	0	0	0
1323		4	0.77	0	0	0	0	0
1324		5	0.77	0	0	0	0	0
1325	19	1	0.77	0	0	0	0	0
1326		2	0.77	0	0	0	0	0
1327		3	0.77	0	0	0	0	0
1328		4	0.77	0	0	0	0	0

Member Section Forces (Continued)

LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1329		5	0.77	0	0	0	0	0
1330	20	1	4.953	0	0	0	0	0
1331		2	4.953	0	0	0	0	0.002
1332		3	4.953	0	0	0	0	0.003
1333		4	4.953	0	0	0	0	0.005
1334		5	4.953	0	0	0	0	0.006
1335	20	1	4.916	0	0	0	0	0.006
1336		2	4.916	0	0	0	0	0.005
1337		3	4.916	0	0	0	0	0.003
1338		4	4.916	0	0	0	0	0.002
1339		5	4.916	0	0	0	0	0
1340	20	1	4.953	0	0	0	0	0
1341		2	4.953	0	0	0	0	-0.002
1342		3	4.953	0	0	0	0	-0.003
1343		4	4.953	0	0	0	0	-0.005
1344		5	4.953	0	0	0	0	-0.006
1345	20	1	4.916	0	0	0	0	-0.006
1346		2	4.916	0	0	0	0	-0.005
1347		3	4.916	0	0	0	0	-0.003
1348		4	4.916	0	0	0	0	-0.002
1349		5	4.916	0	0	0	0	0
1350	20	1	-0.719	5.68	0	0	0	0
1351		2	-0.719	2.84	0	0	0	-16.69
1352		3	-0.719	0	0	0	0	-22.253
1353		4	-0.719	-2.84	0	0	0	-16.69
1354		5	-0.719	-5.68	0	0	0	0
1355	20	1	-1.461	0	0	0	0	0
1356		2	-1.461	0	0	0	0	0
1357		3	-1.461	0	0	0	0	0
1358		4	-1.461	0	0	0	0	0
1359		5	-1.461	0	0	0	0	0
1360	20	1	1.05	0	0	0	0	0
1361		2	1.05	0	0	0	0	0
1362		3	1.05	0	0	0	0	0
1363		4	1.05	0	0	0	0	-0.001
1364		5	1.05	0	0	0	0	-0.001
1365	20	1	1.04	0	0	0	0	0
1366		2	1.04	0	0	0	0	0.001
1367		3	1.04	0	0	0	0	0.001
1368		4	1.04	0	0	0	0	0.002
1369		5	1.04	0	0	0	0	0.003
1370	20	1	1.05	0	0	0	0	-0.001
1371		2	1.05	0	0	0	0	-0.001
1372		3	1.05	0	0	0	0	0
1373		4	1.05	0	0	0	0	0
1374		5	1.05	0	0	0	0	0
1375	20	1	1.04	0	0	0	0	0.003
1376		2	1.04	0	0	0	0	0.002
1377		3	1.04	0	0	0	0	0.001
1378		4	1.04	0	0	0	0	0.001
1379		5	1.04	0	0	0	0	0
1380	20	1	1.05	0	0	0	0	0
1381		2	1.05	0	0	0	0	0
1382		3	1.05	0	0	0	0	0
1383		4	1.05	0	0	0	0	0
1384		5	1.05	0	0	0	0	0
1385	20	1	1.049	0	0	0	0	0
1386		2	1.049	0	0	0	0	0
1387		3	1.049	0	0	0	0	0
1388		4	1.049	0	0	0	0	0
1389		5	1.049	0	0	0	0	0
1390	20	1	1.04	0	0	0	0	0
1391		2	1.04	0	0	0	0	0
1392		3	1.04	0	0	0	0	0
1393		4	1.04	0	0	0	0	0
1394		5	1.04	0	0	0	0	0
1395	20	1	1.04	0	0	0	0	0
1396		2	1.04	0	0	0	0	0

Member Section Forces (Continued)

LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1397		3	1.04	0	0	0	0	0
1398		4	1.04	0	0	0	0	0
1399		5	1.04	0	0	0	0	0
1400	21	1	-26.247	-0.005	0	0	0	0
1401		2	-26.247	-0.005	0	0	0	0.021
1402		3	-26.247	-0.005	0	0	0	0.042
1403		4	-26.247	-0.005	0	0	0	0.062
1404		5	-26.247	-0.005	0	0	0	0.083
1405	21	1	-8.315	0.005	0	0	0	0.083
1406		2	-8.315	0.005	0	0	0	0.062
1407		3	-8.315	0.005	0	0	0	0.042
1408		4	-8.315	0.005	0	0	0	0.021
1409		5	-8.315	0.005	0	0	0	0
1410	21	1	25.771	-0.005	0	0	0	0
1411		2	25.771	-0.005	0	0	0	0.019
1412		3	25.771	-0.005	0	0	0	0.038
1413		4	25.771	-0.005	0	0	0	0.057
1414		5	25.771	-0.005	0	0	0	0.076
1415	21	1	6.784	0.005	0	0	0	0.076
1416		2	6.784	0.005	0	0	0	0.057
1417		3	6.784	0.005	0	0	0	0.038
1418		4	6.784	0.005	0	0	0	0.019
1419		5	6.784	0.005	0	0	0	0
1420	21	1	6.382	0	0	0	0	0
1421		2	6.382	0	0	0	0	0
1422		3	6.382	0	0	0	0	0
1423		4	6.382	0	0	0	0	0
1424		5	6.382	0	0	0	0	0
1425	21	1	3.104	0	0	0	0	0
1426		2	3.104	0	0	0	0	0
1427		3	3.104	0	0	0	0	0
1428		4	3.104	0	0	0	0	0
1429		5	3.104	0	0	0	0	0
1430	21	1	11.404	0.003	0	0	0	0
1431		2	11.404	0.003	0	0	0	-0.008
1432		3	11.404	0.003	0	0	0	-0.017
1433		4	11.404	0.003	0	0	0	-0.025
1434		5	11.404	0.003	0	0	0	-0.034
1435	21	1	-15.274	-0.008	0	0	0	0
1436		2	-15.274	-0.008	0	0	0	0.021
1437		3	-15.274	-0.008	0	0	0	0.041
1438		4	-15.274	-0.008	0	0	0	0.062
1439		5	-15.274	-0.008	0	0	0	0.083
1440	21	1	11.405	-0.003	0	0	0	-0.034
1441		2	11.405	-0.003	0	0	0	-0.025
1442		3	11.405	-0.003	0	0	0	-0.017
1443		4	11.405	-0.003	0	0	0	-0.008
1444		5	11.405	-0.003	0	0	0	0
1445	21	1	-15.268	0.008	0	0	0	0.083
1446		2	-15.268	0.008	0	0	0	0.062
1447		3	-15.268	0.008	0	0	0	0.041
1448		4	-15.268	0.008	0	0	0	0.021
1449		5	-15.268	0.008	0	0	0	0
1450	21	1	-9.312	0	0	0	0	0
1451		2	-9.312	0	0	0	0	0
1452		3	-9.312	0	0	0	0	0
1453		4	-9.312	0	0	0	0	0
1454		5	-9.312	0	0	0	0	0
1455	21	1	-9.316	0	0	0	0	0
1456		2	-9.316	0	0	0	0	0
1457		3	-9.316	0	0	0	0	0
1458		4	-9.316	0	0	0	0	0
1459		5	-9.316	0	0	0	0	0
1460	21	1	15.93	0	0	0	0	0
1461		2	15.93	0	0	0	0	0
1462		3	15.93	0	0	0	0	0
1463		4	15.93	0	0	0	0	0
1464		5	15.93	0	0	0	0	0

Member Section Forces (Continued)

LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
1465	21	M15	1	15.95	0	0	0	0
1466			2	15.95	0	0	0	0
1467			3	15.95	0	0	0	0
1468			4	15.95	0	0	0	0
1469			5	15.95	0	0	0	0

Maximum Member Section Forces

LC	Member Label	Axial[k]	Loc[ft]	y Shear[k]	Loc[ft]	z Shear[k]	Loc[ft]	Torque[k-ft]	Loc[ft]	y-y Moment[k-ft]	Loc[ft]	z-z Moment[k-ft]	Loc[ft]
0	1	M1	max	8.46	15.33	0.369	15.33	0	15.33	0	15.33	0.602	5.589
1			min	8.46	0	-0.214	0	0	0	0	0	-1.189	15.33
2	1	M2	max	5.531	16.67	0.246	16.67	0	16.67	0	16.67	0.794	10.245
3			min	5.531	0	-0.389	0	0	0	0	0	-1.189	0
4	1	M4	max	1.45	15.33	0.37	15.33	0	15.33	0	15.33	0.598	5.589
5			min	1.45	0	-0.213	0	0	0	0	0	-1.202	15.33
6	1	M5	max	4.301	16.67	0.245	16.67	0	16.67	0	16.67	0.789	10.245
7			min	4.301	0	-0.389	0	0	0	0	0	-1.202	0
8	1	M6	max	-0.469	0	5.68	0	0	15.67	0	15.67	0	15.67
9			min	-0.941	15.67	-5.68	15.67	0	0	0	0	-22.253	7.835
10	1	M10	max	-1.204	0	0	15.67	0	15.67	0	15.67	0	15.67
11			min	-1.769	15.67	0	0	0	0	0	0	0	0
12	1	M7	max	0.261	0	0.06	0	0	11.439	0	11.439	0.229	11.439
13			min	0.11	11.439	-0.1	11.439	0	0	0	0	-0.129	4.29
14	1	M8	max	4.008	10.961	0.093	10.961	0	10.961	0	10.961	0.111	4.11
15			min	3.857	0	-0.055	0	0	0	0	0	-0.21	10.961
16	1	M9	max	-0.063	0	0.1	0	0	11.439	0	11.439	0.229	0
17			min	-0.214	11.439	-0.06	11.439	0	0	0	0	-0.129	7.15
18	1	M11	max	4.302	10.961	0.055	10.961	0	10.961	0	10.961	0.111	6.851
19			min	4.151	0	-0.093	0	0	0	0	0	-0.21	0
20	1	M12	max	1.968	11.439	0.08	11.439	0	11.439	0	11.439	0.229	5.72
21			min	1.818	0	-0.08	0	0	0	0	0	0	0
22	1	M13	max	2.33	11.439	0.08	11.439	0	11.439	0	11.439	0.229	5.72
23			min	2.179	0	-0.08	0	0	0	0	0	0	0
24	1	M14	max	-1.763	0	0.074	0	0	10.961	0	10.961	0	10.961
25			min	-1.914	10.961	-0.074	10.961	0	0	0	0	-0.202	5.48
26	1	M15	max	-2.097	0	0.074	0	0	10.961	0	10.961	0	10.961
27			min	-2.247	10.961	-0.074	10.961	0	0	0	0	-0.202	5.48
28	2	M1	max	3.379	15.33	0	15.33	0	15.33	0	15.33	0.003	15.33
29			min	3.379	0	0	0	0	0	0	0	0	0
30	2	M2	max	0.034	16.67	0	16.67	0	16.67	0	16.67	0.003	0
31			min	0.034	0	0	0	0	0	0	0	0	16.67
32	2	M4	max	3.379	15.33	0	15.33	0	15.33	0	15.33	0	0
33			min	3.379	0	0	0	0	0	0	0	-0.003	15.33
34	2	M5	max	0.034	16.67	0	16.67	0	16.67	0	16.67	0	16.67
35			min	0.034	0	0	0	0	0	0	0	-0.003	0
36	2	M6	max	0.032	15.67	0	15.67	0	15.67	0	15.67	0	15.67
37			min	0.032	0	0	0	0	0	0	0	0	0
38	2	M10	max	-0.518	15.67	3.917	0	0	15.67	0	15.67	0	15.67
39			min	-0.518	0	-3.918	15.67	0	0	0	0	-15.347	7.835
40	2	M7	max	-0.047	11.439	0	11.439	0	11.439	0	11.439	0	0
41			min	-0.047	0	0	0	0	0	0	0	-0.001	11.439
42	2	M8	max	0.77	10.961	0	10.961	0	10.961	0	10.961	0.001	10.961
43			min	0.77	0	0	0	0	0	0	0	0	0
44	2	M9	max	-0.047	11.439	0	11.439	0	11.439	0	11.439	0	11.439
45			min	-0.047	0	0	0	0	0	0	0	-0.001	0
46	2	M11	max	0.77	10.961	0	10.961	0	10.961	0	10.961	0.001	0
47			min	0.77	0	0	0	0	0	0	0	0	10.961
48	2	M12	max	-0.047	11.439	0	11.439	0	11.439	0	11.439	0	11.439
49			min	-0.047	0	0	0	0	0	0	0	0	0
50	2	M13	max	-0.047	11.439	0	11.439	0	11.439	0	11.439	0	11.439
51			min	-0.047	0	0	0	0	0	0	0	0	0
52	2	M14	max	0.77	10.961	0	10.961	0	10.961	0	10.961	0	10.961
53			min	0.77	0	0	0	0	0	0	0	0	0
54	2	M15	max	0.77	10.961	0	10.961	0	10.961	0	10.961	0	10.961
55			min	0.77	0	0	0	0	0	0	0	0	0
56	3	M1	max	11.839	15.33	0.369	15.33	0	15.33	0	15.33	0.604	5.589
57			min	11.839	0	-0.214	0	0	0	0	0	-1.186	15.33
58	3	M2	max	5.565	16.67	0.246	16.67	0	16.67	0	16.67	0.796	10.245
59			min	5.565	0	-0.388	0	0	0	0	0	-1.186	0

Maximum Member Section Forces (Continued)

LC	Member Label		Axial[k]	Loc[ft]	y Shear[k]	Loc[ft]	z Shear[k]	Loc[ft]	Torque[k-ft]	Loc[ft]	y-y Moment[k-ft]	Loc[ft]	z-z Moment[k-ft]	Loc[ft]	
60	3	M4	max	4.829	15.33	0.37	15.33	0	15.33	0	15.33	0	15.33	0.597	5.589
61			min	4.829	0	-0.213	0	0	0	0	0	0	-1.206	15.33	
62	3	M5	max	4.335	16.67	0.245	16.67	0	16.67	0	16.67	0	16.67	0.788	10.245
63			min	4.335	0	-0.39	0	0	0	0	0	0	-1.206	0	
64	3	M6	max	-0.437	0	5.68	0	0	15.67	0	15.67	0	15.67	0	15.67
65			min	-0.909	15.67	-5.68	15.67	0	0	0	0	0	-22.253	7.835	
66	3	M10	max	-1.722	0	3.917	0	0	15.67	0	15.67	0	15.67	0	15.67
67			min	-2.287	15.67	-3.918	15.67	0	0	0	0	0	-15.347	7.835	
68	3	M7	max	0.214	0	0.06	0	0	11.439	0	11.439	0	11.439	0.229	11.439
69			min	0.064	11.439	-0.1	11.439	0	0	0	0	0	-0.129	4.29	
70	3	M8	max	4.778	10.961	0.093	10.961	0	10.961	0	10.961	0	10.961	0.111	4.11
71			min	4.627	0	-0.055	0	0	0	0	0	0	-0.209	10.961	
72	3	M9	max	-0.11	0	0.1	0	0	11.439	0	11.439	0	11.439	0.229	0
73			min	-0.26	11.439	-0.06	11.439	0	0	0	0	0	-0.129	7.15	
74	3	M11	max	5.073	10.961	0.055	10.961	0	10.961	0	10.961	0	10.961	0.111	6.851
75			min	4.922	0	-0.093	0	0	0	0	0	0	-0.209	0	
76	3	M12	max	1.922	11.439	0.08	11.439	0	11.439	0	11.439	0	11.439	0.229	5.72
77			min	1.771	0	-0.08	0	0	0	0	0	0	0	0	0
78	3	M13	max	2.283	11.439	0.08	11.439	0	11.439	0	11.439	0	11.439	0.229	5.72
79			min	2.132	0	-0.08	0	0	0	0	0	0	0	0	0
80	3	M14	max	-0.994	0	0.074	0	0	10.961	0	10.961	0	10.961	0	10.961
81			min	-1.144	10.961	-0.074	10.961	0	0	0	0	0	-0.202	5.48	
82	3	M15	max	-1.327	0	0.074	0	0	10.961	0	10.961	0	10.961	0	10.961
83			min	-1.478	10.961	-0.074	10.961	0	0	0	0	0	-0.202	5.48	
84	4	M1	max	11.844	15.33	0.517	15.33	0	15.33	0	15.33	0	15.33	0.843	5.589
85			min	11.844	0	-0.3	0	0	0	0	0	0	-1.665	15.33	
86	4	M2	max	7.744	16.67	0.344	16.67	0	16.67	0	16.67	0	16.67	1.112	10.245
87			min	7.744	0	-0.544	0	0	0	0	0	0	-1.665	0	
88	4	M4	max	2.03	15.33	0.518	15.33	0	15.33	0	15.33	0	15.33	0.837	5.589
89			min	2.03	0	-0.299	0	0	0	0	0	0	-1.683	15.33	
90	4	M5	max	6.021	16.67	0.343	16.67	0	16.67	0	16.67	0	16.67	1.105	10.245
91			min	6.021	0	-0.545	0	0	0	0	0	0	-1.683	0	
92	4	M6	max	-0.657	0	7.953	0	0	15.67	0	15.67	0	15.67	0	15.67
93			min	-1.317	15.67	-7.953	15.67	0	0	0	0	0	-31.154	7.835	
94	4	M10	max	-1.685	0	0	15.67	0	15.67	0	15.67	0	15.67	0	15.67
95			min	-2.477	15.67	0	0	0	0	0	0	0	0	0	0
96	4	M7	max	0.365	0	0.084	0	0	11.439	0	11.439	0	11.439	0.321	11.439
97			min	0.154	11.439	-0.14	11.439	0	0	0	0	0	-0.181	4.29	
98	4	M8	max	5.611	10.961	0.13	10.961	0	10.961	0	10.961	0	10.961	0.155	4.11
99			min	5.4	0	-0.076	0	0	0	0	0	0	-0.294	10.961	
100	4	M9	max	-0.088	0	0.14	0	0	11.439	0	11.439	0	11.439	0.321	0
101			min	-0.3	11.439	-0.084	11.439	0	0	0	0	0	-0.181	7.15	
102	4	M11	max	6.023	10.961	0.076	10.961	0	10.961	0	10.961	0	10.961	0.155	6.851
103			min	5.812	0	-0.13	0	0	0	0	0	0	-0.294	0	
104	4	M12	max	2.756	11.439	0.112	11.439	0	11.439	0	11.439	0	11.439	0.321	5.72
105			min	2.545	0	-0.112	0	0	0	0	0	0	0	0	0
106	4	M13	max	3.262	11.439	0.112	11.439	0	11.439	0	11.439	0	11.439	0.321	5.72
107			min	3.051	0	-0.112	0	0	0	0	0	0	0	0	0
108	4	M14	max	-2.469	0	0.103	0	0	10.961	0	10.961	0	10.961	0	10.961
109			min	-2.68	10.961	-0.103	10.961	0	0	0	0	0	-0.283	5.48	
110	4	M15	max	-2.936	0	0.103	0	0	10.961	0	10.961	0	10.961	0	10.961
111			min	-3.147	10.961	-0.103	10.961	0	0	0	0	0	-0.283	5.48	
112	5	M1	max	18.037	15.33	0.443	15.33	0	15.33	0	15.33	0	15.33	0.726	5.589
113			min	18.037	0	-0.258	0	0	0	0	0	0	-1.419	15.33	
114	5	M2	max	9.15	16.67	0.296	16.67	0	16.67	0	16.67	0	16.67	0.956	10.245
115			min	9.15	0	-0.466	0	0	0	0	0	0	-1.419	0	
116	5	M4	max	9.621	15.33	0.445	15.33	0	15.33	0	15.33	0	15.33	0.714	5.589
117			min	9.621	0	-0.255	0	0	0	0	0	0	-1.451	15.33	
118	5	M5	max	7.673	16.67	0.294	16.67	0	16.67	0	16.67	0	16.67	0.944	10.245
119			min	7.673	0	-0.468	0	0	0	0	0	0	-1.451	0	
120	5	M6	max	-0.872	0	9.657	0	0	15.67	0	15.67	0	15.67	0	15.67
121			min	-1.438	15.67	-9.657	15.67	0	0	0	0	0	-37.83	7.835	
122	5	M10	max	-3.004	0	6.268	0	0	15.67	0	15.67	0	15.67	0	15.67
123			min	-3.682	15.67	-6.268	15.67	0	0	0	0	0	-24.555	7.835	
124	5	M7	max	0.763	0	0.072	0	0	11.439	0	11.439	0	11.439	0.273	11.439
125			min	0.582	11.439	-0.12	11.439	0	0	0	0	0	-0.156	4.29	
126	5	M8	max	6.563	10.961	0.111	10.961	0	10.961	0	10.961	0	10.961	0.134	4.11
127			min	6.382	0	-0.066	0	0	0	0	0	0	-0.25	10.961	

Maximum Member Section Forces (Continued)

LC	Member Label		Axial[k]	Loc[ft]	y Shear[k]	Loc[ft]	z Shear[k]	Loc[ft]	Torque[k-ft]	Loc[ft]	y-y Moment[k-ft]	Loc[ft]	z-z Moment[k-ft]	Loc[ft]
128	5	M9	max	0.374	0	0.12	0	11.439	0	11.439	0	11.439	0.273	0
129			min	0.193	11.439	-0.072	11.439	0	0	0	0	0	-0.156	7.15
130	5	M11	max	6.916	10.961	0.066	10.961	0	10.961	0	10.961	0	0.134	6.851
131			min	6.735	0	-0.111	0	0	0	0	0	0	-0.25	0
132	5	M12	max	2.813	11.439	0.096	11.439	0	11.439	0	11.439	0	0.275	5.72
133			min	2.632	0	-0.096	0	0	0	0	0	0	0	0
134	5	M13	max	3.246	11.439	0.096	11.439	0	11.439	0	11.439	0	0.275	5.72
135			min	3.065	0	-0.096	0	0	0	0	0	0	0	0
136	5	M14	max	-0.366	0	0.089	0	10.961	0	10.961	0	10.961	0	10.961
137			min	-0.547	10.961	-0.089	10.961	0	0	0	0	0	-0.243	5.48
138	5	M15	max	-0.765	0	0.089	0	10.961	0	10.961	0	10.961	0	10.961
139			min	-0.946	10.961	-0.089	10.961	0	0	0	0	0	-0.243	5.48
140	6	M1	max	15.559	15.33	0.443	15.33	0	15.33	0	15.33	0	0.725	5.589
141			min	15.559	0	-0.257	0	0	0	0	0	0	-1.422	15.33
142	6	M2	max	6.692	16.67	0.295	16.67	0	16.67	0	16.67	0	0.955	10.245
143			min	6.692	0	-0.466	0	0	0	0	0	0	-1.422	0
144	6	M4	max	7.146	15.33	0.445	15.33	0	15.33	0	15.33	0	0.715	5.589
145			min	7.146	0	-0.256	0	0	0	0	0	0	-1.448	15.33
146	6	M5	max	5.216	16.67	0.294	16.67	0	16.67	0	16.67	0	0.945	10.245
147			min	5.216	0	-0.468	0	0	0	0	0	0	-1.448	0
148	6	M6	max	-0.512	0	6.816	0	15.67	0	15.67	0	15.67	0	15.67
149			min	-1.078	15.67	-6.816	15.67	0	0	0	0	0	-26.703	7.835
150	6	M10	max	-2.274	0	6.268	0	15.67	0	15.67	0	15.67	0	15.67
151			min	-2.952	15.67	-6.268	15.67	0	0	0	0	0	-24.555	7.835
152	6	M7	max	0.238	0	0.072	0	11.439	0	11.439	0	11.439	0.274	11.439
153			min	0.057	11.439	-0.12	11.439	0	0	0	0	0	-0.155	4.29
154	6	M8	max	6.042	10.961	0.111	10.961	0	10.961	0	10.961	0	0.133	4.11
155			min	5.861	0	-0.066	0	0	0	0	0	0	-0.251	10.961
156	6	M9	max	-0.15	0	0.12	0	11.439	0	11.439	0	11.439	0.274	0
157			min	-0.331	11.439	-0.072	11.439	0	0	0	0	0	-0.155	7.15
158	6	M11	max	6.396	10.961	0.066	10.961	0	10.961	0	10.961	0	0.133	6.851
159			min	6.215	0	-0.111	0	0	0	0	0	0	-0.251	0
160	6	M12	max	2.288	11.439	0.096	11.439	0	11.439	0	11.439	0	0.275	5.72
161			min	2.107	0	-0.096	0	0	0	0	0	0	0	0
162	6	M13	max	2.721	11.439	0.096	11.439	0	11.439	0	11.439	0	0.275	5.72
163			min	2.54	0	-0.096	0	0	0	0	0	0	0	0
164	6	M14	max	-0.885	0	0.089	0	10.961	0	10.961	0	10.961	0	10.961
165			min	-1.066	10.961	-0.089	10.961	0	0	0	0	0	-0.243	5.48
166	6	M15	max	-1.285	0	0.089	0	10.961	0	10.961	0	10.961	0	10.961
167			min	-1.466	10.961	-0.089	10.961	0	0	0	0	0	-0.243	5.48
168	7	M1	max	19.77	15.33	0.442	15.33	0	15.33	0	15.33	0	0.727	5.589
169			min	19.77	0	-0.258	0	0	0	0	0	0	-1.415	15.33
170	7	M2	max	14.521	16.67	0.296	16.67	0	16.67	0	16.67	0	0.958	10.245
171			min	14.521	0	-0.466	0	0	0	0	0	0	-1.415	0
172	7	M4	max	11.352	15.33	0.445	15.33	0	15.33	0	15.33	0	0.713	5.589
173			min	11.352	0	-0.255	0	0	0	0	0	0	-1.454	15.33
174	7	M5	max	13.042	16.67	0.293	16.67	0	16.67	0	16.67	0	0.943	10.245
175			min	13.042	0	-0.468	0	0	0	0	0	0	-1.454	0
176	7	M6	max	-1.698	0	15.905	0	15.67	0	15.67	0	15.67	0	15.67
177			min	-2.264	15.67	-15.905	15.67	0	0	0	0	0	-62.308	7.835
178	7	M10	max	-4.042	0	1.959	0	15.67	0	15.67	0	15.67	0	15.67
179			min	-4.72	15.67	-1.959	15.67	0	0	0	0	0	-7.673	7.835
180	7	M7	max	1.968	0	0.072	0	11.439	0	11.439	0	11.439	0.273	11.439
181			min	1.787	11.439	-0.12	11.439	0	0	0	0	0	-0.156	4.29
182	7	M8	max	6.86	10.961	0.111	10.961	0	10.961	0	10.961	0	0.134	4.11
183			min	6.679	0	-0.066	0	0	0	0	0	0	-0.248	10.961
184	7	M9	max	1.579	0	0.12	0	11.439	0	11.439	0	11.439	0.273	0
185			min	1.398	11.439	-0.072	11.439	0	0	0	0	0	-0.156	7.15
186	7	M11	max	7.213	10.961	0.066	10.961	0	10.961	0	10.961	0	0.134	6.851
187			min	7.032	0	-0.111	0	0	0	0	0	0	-0.248	0
188	7	M12	max	4.019	11.439	0.096	11.439	0	11.439	0	11.439	0	0.275	5.72
189			min	3.838	0	-0.096	0	0	0	0	0	0	0	0
190	7	M13	max	4.453	11.439	0.096	11.439	0	11.439	0	11.439	0	0.275	5.72
191			min	4.272	0	-0.096	0	0	0	0	0	0	0	0
192	7	M14	max	-0.069	0	0.089	0	10.961	0	10.961	0	10.961	0	10.961
193			min	-0.25	10.961	-0.089	10.961	0	0	0	0	0	-0.243	5.48
194	7	M15	max	-0.469	0	0.089	0	10.961	0	10.961	0	10.961	0	10.961
195			min	-0.65	10.961	-0.089	10.961	0	0	0	0	0	-0.243	5.48

Maximum Member Section Forces (Continued)

LC	Member Label		Axial[k]	Loc[ft]	y Shear[k]	Loc[ft]	z Shear[k]	Loc[ft]	Torque[k-ft]	Loc[ft]	y-y Moment[k-ft]	Loc[ft]	z-z Moment[k-ft]	Loc[ft]	
196	8	M1	max	4.945	15.33	0.44	15.33	0	15.33	0	15.33	0	15.33	0.742	5.749
197			min	4.945	0	-0.26	0	0	0	0	0	0	-1.375	15.33	
198	8	M2	max	10.343	16.67	0.298	16.67	0	16.67	0	16.67	0	16.67	0.973	10.071
199			min	10.343	0	-0.463	0	0	0	0	0	0	-1.375	0	
200	8	M4	max	22.562	15.33	0.442	15.33	0	15.33	0	15.33	0	15.33	0.728	5.589
201			min	22.562	0	-0.258	0	0	0	0	0	0	-1.414	15.33	
202	8	M5	max	16.423	16.67	0.296	16.67	0	16.67	0	16.67	0	16.67	0.958	10.245
203			min	16.423	0	-0.466	0	0	0	0	0	0	-1.414	0	
204	8	M6	max	1.477	0	15.905	0	0	15.67	0	15.67	0	15.67	0	15.67
205			min	0.911	15.67	-15.905	15.67	0	0	0	0	0	-62.308	7.835	
206	8	M10	max	-2.232	0	0	15.67	0	15.67	0	15.67	0	15.67	0	15.67
207			min	-2.91	15.67	0	0	0	0	0	0	0	0	0	0
208	8	M7	max	7.701	0	0.074	0	0	11.439	0	11.439	0	11.439	0.257	11.439
209			min	7.52	11.439	-0.119	11.439	0	0	0	0	0	-0.162	4.409	
210	8	M8	max	-1.167	10.961	0.107	10.961	0	10.961	0	10.961	0	10.961	0.15	4.339
211			min	-1.348	0	-0.07	0	0	0	0	0	0	-0.207	10.961	
212	8	M9	max	7.312	0	0.119	0	0	11.439	0	11.439	0	11.439	0.257	0
213			min	7.131	11.439	-0.074	11.439	0	0	0	0	0	-0.162	7.03	
214	8	M11	max	-0.813	10.961	0.07	10.961	0	10.961	0	10.961	0	10.961	0.15	6.622
215			min	-0.994	0	-0.107	0	0	0	0	0	0	-0.207	0	
216	8	M12	max	-0.62	11.439	0.096	11.439	0	11.439	0	11.439	0	11.439	0.275	5.72
217			min	-0.801	0	-0.096	0	0	0	0	0	0	0	0	0
218	8	M13	max	-0.188	11.439	0.096	11.439	0	11.439	0	11.439	0	11.439	0.275	5.72
219			min	-0.369	0	-0.096	0	0	0	0	0	0	0	0	0
220	8	M14	max	7.519	0	0.089	0	0	10.961	0	10.961	0	10.961	0	10.961
221			min	7.338	10.961	-0.089	10.961	0	0	0	0	0	-0.243	5.48	
222	8	M15	max	7.127	0	0.089	0	0	10.961	0	10.961	0	10.961	0	10.961
223			min	6.946	10.961	-0.089	10.961	0	0	0	0	0	-0.243	5.48	
224	9	M1	max	31.21	15.33	0.445	15.33	0	15.33	0	15.33	0	15.33	0.711	5.589
225			min	31.21	0	-0.255	0	0	0	0	0	0	-1.459	15.33	
226	9	M2	max	18.661	16.67	0.293	16.67	0	16.67	0	16.67	0	16.67	0.941	10.245
227			min	18.661	0	-0.468	0	0	0	0	0	0	-1.459	0	
228	9	M4	max	-3.237	15.33	0.447	15.33	0	15.33	0	15.33	0	15.33	0.7	5.589
229			min	-3.237	0	-0.253	0	0	0	0	0	0	-1.491	15.33	
230	9	M5	max	9.628	16.67	0.291	16.67	0	16.67	0	16.67	0	16.67	0.928	10.245
231			min	9.628	0	-0.47	0	0	0	0	0	0	-1.491	0	
232	9	M6	max	-4.904	0	15.905	0	0	15.67	0	15.67	0	15.67	0	15.67
233			min	-5.471	15.67	-15.905	15.67	0	0	0	0	0	-62.308	7.835	
234	9	M10	max	-5.333	0	0	15.67	0	15.67	0	15.67	0	15.67	0	15.67
235			min	-6.011	15.67	0	0	0	0	0	0	0	0	0	0
236	9	M7	max	-3.719	0	0.071	0	0	11.439	0	11.439	0	11.439	0.291	11.439
237			min	-3.9	11.439	-0.122	11.439	0	0	0	0	0	-0.149	4.171	
238	9	M8	max	14.115	10.961	0.115	10.961	0	10.961	0	10.961	0	10.961	0.119	3.882
239			min	13.934	0	-0.062	0	0	0	0	0	0	-0.29	10.961	
240	9	M9	max	-4.107	0	0.122	0	0	11.439	0	11.439	0	11.439	0.291	0
241			min	-4.288	11.439	-0.071	11.439	0	0	0	0	0	-0.149	7.269	
242	9	M11	max	14.47	10.961	0.062	10.961	0	10.961	0	10.961	0	10.961	0.119	7.079
243			min	14.289	0	-0.115	0	0	0	0	0	0	-0.29	0	
244	9	M12	max	8.705	11.439	0.096	11.439	0	11.439	0	11.439	0	11.439	0.275	5.72
245			min	8.524	0	-0.096	0	0	0	0	0	0	0	0	0
246	9	M13	max	9.142	11.439	0.096	11.439	0	11.439	0	11.439	0	11.439	0.275	5.72
247			min	8.961	0	-0.096	0	0	0	0	0	0	0	0	0
248	9	M14	max	-8.428	0	0.089	0	0	10.961	0	10.961	0	10.961	0	10.961
249			min	-8.609	10.961	-0.089	10.961	0	0	0	0	0	-0.243	5.48	
250	9	M15	max	-8.833	0	0.089	0	0	10.961	0	10.961	0	10.961	0	10.961
251			min	-9.014	10.961	-0.089	10.961	0	0	0	0	0	-0.243	5.48	
252	10	M1	max	-2.975	15.33	0.44	15.33	0	15.33	0	15.33	0	15.33	0.738	5.749
253			min	-2.975	0	-0.26	0	0	0	0	0	0	-1.386	15.33	
254	10	M2	max	2.48	16.67	0.298	16.67	0	16.67	0	16.67	0	16.67	0.969	10.071
255			min	2.48	0	-0.464	0	0	0	0	0	0	-1.386	0	
256	10	M4	max	14.632	15.33	0.442	15.33	0	15.33	0	15.33	0	15.33	0.731	5.589
257			min	14.632	0	-0.258	0	0	0	0	0	0	-1.404	15.33	
258	10	M5	max	8.556	16.67	0.296	16.67	0	16.67	0	16.67	0	16.67	0.962	10.245
259			min	8.556	0	-0.465	0	0	0	0	0	0	-1.404	0	
260	10	M6	max	2.628	0	6.816	0	0	15.67	0	15.67	0	15.67	0	15.67
261			min	2.062	15.67	-6.816	15.67	0	0	0	0	0	-26.703	7.835	
262	10	M10	max	0.107	0	0	15.67	0	15.67	0	15.67	0	15.67	0	15.67
263			min	-0.572	15.67	0	0	0	0	0	0	0	0	0	0

Maximum Member Section Forces (Continued)

LC	Member Label		Axial[k]	Loc[ft]	y Shear[k]	Loc[ft]	z Shear[k]	Loc[ft]	Torque[k-ft]	Loc[ft]	y-y Moment[k-ft]	Loc[ft]	z-z Moment[k-ft]	Loc[ft]
264	10	M7	max	6.019	0	0.074	0	0	11.439	0	11.439	0	0.258	11.439
265			min	5.838	11.439	-0.119	11.439	0	0	0	0	0	-0.161	4.409
266	10	M8	max	-2.829	10.961	0.108	10.961	0	10.961	0	10.961	0	0.149	4.339
267			min	-3.01	0	-0.069	0	0	0	0	0	0	-0.211	10.961
268	10	M9	max	5.63	0	0.119	0	0	11.439	0	11.439	0	0.258	0
269			min	5.449	11.439	-0.074	11.439	0	0	0	0	0	-0.161	7.03
270	10	M11	max	-2.475	10.961	0.069	10.961	0	10.961	0	10.961	0	0.149	6.622
271			min	-2.656	0	-0.108	0	0	0	0	0	0	-0.211	0
272	10	M12	max	-2.296	11.439	0.096	11.439	0	11.439	0	11.439	0	0.275	5.72
273			min	-2.477	0	-0.096	0	0	0	0	0	0	0	0
274	10	M13	max	-1.865	11.439	0.096	11.439	0	11.439	0	11.439	0	0.275	5.72
275			min	-2.046	0	-0.096	0	0	0	0	0	0	0	0
276	10	M14	max	5.853	0	0.089	0	0	10.961	0	10.961	0	0	10.961
277			min	5.672	10.961	-0.089	10.961	0	0	0	0	0	-0.243	5.48
278	10	M15	max	5.461	0	0.089	0	0	10.961	0	10.961	0	0	10.961
279			min	5.28	10.961	-0.089	10.961	0	0	0	0	0	-0.243	5.48
280	11	M1	max	23.274	15.33	0.446	15.33	0	15.33	0	15.33	0	0.708	5.589
281			min	23.274	0	-0.254	0	0	0	0	0	0	-1.469	15.33
282	11	M2	max	10.792	16.67	0.293	16.67	0	16.67	0	16.67	0	0.937	10.245
283			min	10.792	0	-0.469	0	0	0	0	0	0	-1.469	0
284	11	M4	max	-11.151	15.33	0.447	15.33	0	15.33	0	15.33	0	0.703	5.589
285			min	-11.151	0	-0.253	0	0	0	0	0	0	-1.481	15.33
286	11	M5	max	1.767	16.67	0.292	16.67	0	16.67	0	16.67	0	0.932	10.245
287			min	1.767	0	-0.47	0	0	0	0	0	0	-1.481	0
288	11	M6	max	-3.753	0	6.816	0	0	15.67	0	15.67	0	0	15.67
289			min	-4.32	15.67	-6.816	15.67	0	0	0	0	0	-26.703	7.835
290	11	M10	max	-2.995	0	0	15.67	0	15.67	0	15.67	0	0	15.67
291			min	-3.673	15.67	0	0	0	0	0	0	0	0	0
292	11	M7	max	-5.393	0	0.071	0	0	11.439	0	11.439	0	0.292	11.439
293			min	-5.574	11.439	-0.122	11.439	0	0	0	0	0	-0.149	4.171
294	11	M8	max	12.446	10.961	0.115	10.961	0	10.961	0	10.961	0	0.118	3.768
295			min	12.265	0	-0.062	0	0	0	0	0	0	-0.294	10.961
296	11	M9	max	-5.782	0	0.122	0	0	11.439	0	11.439	0	0.292	0
297			min	-5.963	11.439	-0.071	11.439	0	0	0	0	0	-0.149	7.269
298	11	M11	max	12.801	10.961	0.062	10.961	0	10.961	0	10.961	0	0.118	7.193
299			min	12.62	0	-0.115	0	0	0	0	0	0	-0.294	0
300	11	M12	max	7.02	11.439	0.096	11.439	0	11.439	0	11.439	0	0.275	5.72
301			min	6.839	0	-0.096	0	0	0	0	0	0	0	0
302	11	M13	max	7.457	11.439	0.096	11.439	0	11.439	0	11.439	0	0.275	5.72
303			min	7.276	0	-0.096	0	0	0	0	0	0	0	0
304	11	M14	max	-10.087	0	0.089	0	0	10.961	0	10.961	0	0	10.961
305			min	-10.268	10.961	-0.089	10.961	0	0	0	0	0	-0.243	5.48
306	11	M15	max	-10.492	0	0.089	0	0	10.961	0	10.961	0	0	10.961
307			min	-10.673	10.961	-0.089	10.961	0	0	0	0	0	-0.243	5.48
308	12	M1	max	-11.944	15.33	0.437	15.33	0	15.33	0	15.33	0	0.756	5.749
309			min	-11.944	0	-0.263	0	0	0	0	0	0	-1.339	15.33
310	12	M2	max	0.793	16.67	0.3	16.67	0	16.67	0	16.67	0	0.988	10.071
311			min	0.793	0	-0.461	0	0	0	0	0	0	-1.339	0
312	12	M4	max	31.695	15.33	0.44	15.33	0	15.33	0	15.33	0	0.744	5.749
313			min	31.695	0	-0.261	0	0	0	0	0	0	-1.371	15.33
314	12	M5	max	14.426	16.67	0.298	16.67	0	16.67	0	16.67	0	0.975	10.071
315			min	14.426	0	-0.463	0	0	0	0	0	0	-1.371	0
316	12	M6	max	5.475	0	9.657	0	0	15.67	0	15.67	0	0	15.67
317			min	4.909	15.67	-9.657	15.67	0	0	0	0	0	-37.83	7.835
318	12	M10	max	0.669	0	1.959	0	0	15.67	0	15.67	0	0	15.67
319			min	-0.009	15.67	-1.959	15.67	0	0	0	0	0	-7.673	7.835
320	12	M7	max	12.227	0	0.075	0	0	11.439	0	11.439	0	0.241	11.439
321			min	12.046	11.439	-0.117	11.439	0	0	0	0	0	-0.168	4.528
322	12	M8	max	-9.566	10.961	0.104	10.961	0	10.961	0	10.961	0	0.166	4.567
323			min	-9.747	0	-0.073	0	0	0	0	0	0	-0.168	10.961
324	12	M9	max	11.839	0	0.117	0	0	11.439	0	11.439	0	0.241	0
325			min	11.658	11.439	-0.075	11.439	0	0	0	0	0	-0.168	6.911
326	12	M11	max	-9.208	10.961	0.073	10.961	0	10.961	0	10.961	0	0.166	6.394
327			min	-9.389	0	-0.104	0	0	0	0	0	0	-0.168	0
328	12	M12	max	-6.456	11.439	0.096	11.439	0	11.439	0	11.439	0	0.275	5.72
329			min	-6.637	0	-0.096	0	0	0	0	0	0	0	0
330	12	M13	max	-6.026	11.439	0.096	11.439	0	11.439	0	11.439	0	0.275	5.72
331			min	-6.207	0	-0.096	0	0	0	0	0	0	0	0

Maximum Member Section Forces (Continued)

LC	Member Label		Axial[k]	Loc[ft]	y Shear[k]	Loc[ft]	z Shear[k]	Loc[ft]	Torque[k-ft]	Loc[ft]	y-y Moment[k-ft]	Loc[ft]	z-z Moment[k-ft]	Loc[ft]
332	12	M14	max	14.728	0	0.089	0	0	10.961	0	10.961	0	10.961	10.961
333			min	14.547	10.961	-0.089	10.961	0	0	0	0	0	-0.243	5.48
334	12	M15	max	14.346	0	0.089	0	0	10.961	0	10.961	0	10.961	10.961
335			min	14.165	10.961	-0.089	10.961	0	0	0	0	0	-0.243	5.48
336	13	M1	max	40.565	15.33	0.448	15.33	0	15.33	0	15.33	0	15.33	5.589
337			min	40.565	0	-0.252	0	0	0	0	0	0	-1.506	15.33
338	13	M2	max	17.419	16.67	0.29	16.67	0	16.67	0	16.67	0	16.67	10.245
339			min	17.419	0	-0.471	0	0	0	0	0	0	-1.506	0
340	13	M4	max	-19.882	15.33	0.449	15.33	0	15.33	0	15.33	0	15.33	5.429
341			min	-19.882	0	-0.251	0	0	0	0	0	0	-1.524	15.33
342	13	M5	max	0.846	16.67	0.289	16.67	0	16.67	0	16.67	0	16.67	10.419
343			min	0.846	0	-0.472	0	0	0	0	0	0	-1.524	0
344	13	M6	max	-7.288	0	9.657	0	0	15.67	0	15.67	0	15.67	15.67
345			min	-7.854	15.67	-9.657	15.67	0	0	0	0	0	-37.83	7.835
346	13	M10	max	-5.534	0	1.959	0	0	15.67	0	15.67	0	15.67	15.67
347			min	-6.212	15.67	-1.959	15.67	0	0	0	0	0	-7.673	7.835
348	13	M7	max	-10.601	0	0.069	0	0	11.439	0	11.439	0	11.439	11.439
349			min	-10.782	11.439	-0.123	11.439	0	0	0	0	0	-0.143	4.171
350	13	M8	max	20.99	10.961	0.119	10.961	0	10.961	0	10.961	0	10.961	3.654
351			min	20.809	0	-0.058	0	0	0	0	0	0	-0.333	10.961
352	13	M9	max	-10.989	0	0.123	0	0	11.439	0	11.439	0	11.439	11.439
353			min	-11.17	11.439	-0.069	11.439	0	0	0	0	0	-0.143	7.269
354	13	M11	max	21.35	10.961	0.058	10.961	0	10.961	0	10.961	0	10.961	7.307
355			min	21.169	0	-0.119	0	0	0	0	0	0	-0.333	0
356	13	M12	max	12.182	11.439	0.096	11.439	0	11.439	0	11.439	0	11.439	5.72
357			min	12.001	0	-0.096	0	0	0	0	0	0	0	0
358	13	M13	max	12.623	11.439	0.096	11.439	0	11.439	0	11.439	0	11.439	5.72
359			min	12.442	0	-0.096	0	0	0	0	0	0	0	0
360	13	M14	max	-17.159	0	0.089	0	0	10.961	0	10.961	0	10.961	10.961
361			min	-17.34	10.961	-0.089	10.961	0	0	0	0	0	-0.243	5.48
362	13	M15	max	-17.567	0	0.089	0	0	10.961	0	10.961	0	10.961	10.961
363			min	-17.748	10.961	-0.089	10.961	0	0	0	0	0	-0.243	5.48
364	14	M1	max	-14.417	15.33	0.438	15.33	0	15.33	0	15.33	0	15.33	5.749
365			min	-14.417	0	-0.263	0	0	0	0	0	0	-1.342	15.33
366	14	M2	max	-1.663	16.67	0.3	16.67	0	16.67	0	16.67	0	16.67	10.071
367			min	-1.663	0	-0.461	0	0	0	0	0	0	-1.342	0
368	14	M4	max	29.214	15.33	0.439	15.33	0	15.33	0	15.33	0	15.33	5.749
369			min	29.214	0	-0.261	0	0	0	0	0	0	-1.368	15.33
370	14	M5	max	11.967	16.67	0.299	16.67	0	16.67	0	16.67	0	16.67	10.071
371			min	11.967	0	-0.463	0	0	0	0	0	0	-1.368	0
372	14	M6	max	5.835	0	6.816	0	0	15.67	0	15.67	0	15.67	15.67
373			min	5.269	15.67	-6.816	15.67	0	0	0	0	0	-26.703	7.835
374	14	M10	max	1.4	0	1.959	0	0	15.67	0	15.67	0	15.67	15.67
375			min	0.722	15.67	-1.959	15.67	0	0	0	0	0	-7.673	7.835
376	14	M7	max	11.7	0	0.075	0	0	11.439	0	11.439	0	11.439	11.439
377			min	11.519	11.439	-0.117	11.439	0	0	0	0	0	-0.168	4.409
378	14	M8	max	-10.085	10.961	0.104	10.961	0	10.961	0	10.961	0	10.961	4.567
379			min	-10.266	0	-0.073	0	0	0	0	0	0	-0.169	10.961
380	14	M9	max	11.312	0	0.117	0	0	11.439	0	11.439	0	11.439	11.439
381			min	11.131	11.439	-0.075	11.439	0	0	0	0	0	-0.168	7.03
382	14	M11	max	-9.727	10.961	0.073	10.961	0	10.961	0	10.961	0	10.961	6.394
383			min	-9.908	0	-0.104	0	0	0	0	0	0	-0.169	0
384	14	M12	max	-6.979	11.439	0.096	11.439	0	11.439	0	11.439	0	11.439	5.72
385			min	-7.16	0	-0.096	0	0	0	0	0	0	0	0
386	14	M13	max	-6.549	11.439	0.096	11.439	0	11.439	0	11.439	0	11.439	5.72
387			min	-6.73	0	-0.096	0	0	0	0	0	0	0	0
388	14	M14	max	14.207	0	0.089	0	0	10.961	0	10.961	0	10.961	10.961
389			min	14.026	10.961	-0.089	10.961	0	0	0	0	0	-0.243	5.48
390	14	M15	max	13.825	0	0.089	0	0	10.961	0	10.961	0	10.961	10.961
391			min	13.644	10.961	-0.089	10.961	0	0	0	0	0	-0.243	5.48
392	15	M1	max	38.082	15.33	0.449	15.33	0	15.33	0	15.33	0	15.33	5.589
393			min	38.082	0	-0.252	0	0	0	0	0	0	-1.509	15.33
394	15	M2	max	14.959	16.67	0.29	16.67	0	16.67	0	16.67	0	16.67	10.245
395			min	14.959	0	-0.471	0	0	0	0	0	0	-1.509	0
396	15	M4	max	-22.353	15.33	0.449	15.33	0	15.33	0	15.33	0	15.33	5.429
397			min	-22.353	0	-0.251	0	0	0	0	0	0	-1.521	15.33
398	15	M5	max	-1.61	16.67	0.289	16.67	0	16.67	0	16.67	0	16.67	10.419
399			min	-1.61	0	-0.472	0	0	0	0	0	0	-1.521	0

Maximum Member Section Forces (Continued)

LC	Member Label		Axial[k]	Loc[ft]	y Shear[k]	Loc[ft]	z Shear[k]	Loc[ft]	Torque[k-ft]	Loc[ft]	y-y Moment[k-ft]	Loc[ft]	z-z Moment[k-ft]	Loc[ft]	
400	15	M6	max	-6.928	0	6.816	0	0	15.67	0	15.67	0	15.67	0	15.67
401			min	-7.494	15.67	-6.816	15.67	0	0	0	0	0	-26.703	7.835	
402	15	M10	max	-4.803	0	1.959	0	0	15.67	0	15.67	0	15.67	0	15.67
403			min	-5.482	15.67	-1.959	15.67	0	0	0	0	0	-7.673	7.835	
404	15	M7	max	-11.123	0	0.069	0	0	11.439	0	11.439	0	11.439	0.308	11.439
405			min	-11.304	11.439	-0.123	11.439	0	0	0	0	0	-0.143	4.171	
406	15	M8	max	20.467	10.961	0.119	10.961	0	10.961	0	10.961	0	10.961	0.104	3.539
407			min	20.287	0	-0.058	0	0	0	0	0	0	-0.335	10.961	
408	15	M9	max	-11.511	0	0.123	0	0	11.439	0	11.439	0	11.439	0.308	0
409			min	-11.692	11.439	-0.069	11.439	0	0	0	0	0	-0.143	7.269	
410	15	M11	max	20.828	10.961	0.058	10.961	0	10.961	0	10.961	0	10.961	0.104	7.421
411			min	20.647	0	-0.119	0	0	0	0	0	0	-0.335	0	
412	15	M12	max	11.654	11.439	0.096	11.439	0	11.439	0	11.439	0	11.439	0.275	5.72
413			min	11.473	0	-0.096	0	0	0	0	0	0	0	0	0
414	15	M13	max	12.095	11.439	0.096	11.439	0	11.439	0	11.439	0	11.439	0.275	5.72
415			min	11.914	0	-0.096	0	0	0	0	0	0	0	0	0
416	15	M14	max	-17.676	0	0.089	0	0	10.961	0	10.961	0	10.961	0	10.961
417			min	-17.857	10.961	-0.089	10.961	0	0	0	0	0	-0.243	5.48	
418	15	M15	max	-18.084	0	0.089	0	0	10.961	0	10.961	0	10.961	0	10.961
419			min	-18.265	10.961	-0.089	10.961	0	0	0	0	0	-0.243	5.48	
420	16	M1	max	-18.641	15.33	0.327	15.33	0	15.33	0	15.33	0	15.33	0.573	5.749
421			min	-18.641	0	-0.198	0	0	0	0	0	0	-0.987	15.33	
422	16	M2	max	-3.339	16.67	0.226	16.67	0	16.67	0	16.67	0	16.67	0.748	10.071
423			min	-3.339	0	-0.345	0	0	0	0	0	0	-0.987	0	0
424	16	M4	max	27.086	15.33	0.328	15.33	0	15.33	0	15.33	0	15.33	0.566	5.749
425			min	27.086	0	-0.197	0	0	0	0	0	0	-1.006	15.33	
426	16	M5	max	10.659	16.67	0.225	16.67	0	16.67	0	16.67	0	16.67	0.74	10.071
427			min	10.659	0	-0.346	0	0	0	0	0	0	-1.006	0	0
428	16	M6	max	5.96	0	5.112	0	0	15.67	0	15.67	0	15.67	0	15.67
429			min	5.535	15.67	-5.112	15.67	0	0	0	0	0	-20.028	7.835	
430	16	M10	max	2.02	0	0	15.67	0	15.67	0	15.67	0	15.67	0	15.67
431			min	1.511	15.67	0	0	0	0	0	0	0	0	0	0
432	16	M7	max	11.644	0	0.057	0	0	11.439	0	11.439	0	11.439	0.173	11.439
433			min	11.508	11.439	-0.087	11.439	0	0	0	0	0	-0.129	4.528	
434	16	M8	max	-11.67	10.961	0.076	10.961	0	10.961	0	10.961	0	10.961	0.133	4.681
435			min	-11.806	0	-0.057	0	0	0	0	0	0	-0.107	10.961	
436	16	M9	max	11.353	0	0.087	0	0	11.439	0	11.439	0	11.439	0.173	0
437			min	11.218	11.439	-0.057	11.439	0	0	0	0	0	-0.129	6.911	
438	16	M11	max	-11.4	10.961	0.057	10.961	0	10.961	0	10.961	0	10.961	0.133	6.28
439			min	-11.536	0	-0.076	0	0	0	0	0	0	-0.107	0	0
440	16	M12	max	-7.545	11.439	0.072	11.439	0	11.439	0	11.439	0	11.439	0.206	5.72
441			min	-7.68	0	-0.072	0	0	0	0	0	0	0	0	0
442	16	M13	max	-7.223	11.439	0.072	11.439	0	11.439	0	11.439	0	11.439	0.206	5.72
443			min	-7.359	0	-0.072	0	0	0	0	0	0	0	0	0
444	16	M14	max	14.348	0	0.066	0	0	10.961	0	10.961	0	10.961	0	10.961
445			min	14.212	10.961	-0.066	10.961	0	0	0	0	0	-0.182	5.48	
446	16	M15	max	14.066	0	0.066	0	0	10.961	0	10.961	0	10.961	0	10.961
447			min	13.931	10.961	-0.066	10.961	0	0	0	0	0	-0.182	5.48	
448	17	M1	max	33.851	15.33	0.338	15.33	0	15.33	0	15.33	0	15.33	0.512	5.429
449			min	33.851	0	-0.187	0	0	0	0	0	0	-1.154	15.33	
450	17	M2	max	13.282	16.67	0.216	16.67	0	16.67	0	16.67	0	16.67	0.683	10.419
451			min	13.282	0	-0.355	0	0	0	0	0	0	-1.154	0	0
452	17	M4	max	-24.472	15.33	0.338	15.33	0	15.33	0	15.33	0	15.33	0.51	5.429
453			min	-24.472	0	-0.187	0	0	0	0	0	0	-1.158	15.33	
454	17	M5	max	-2.916	16.67	0.216	16.67	0	16.67	0	16.67	0	16.67	0.681	10.419
455			min	-2.916	0	-0.355	0	0	0	0	0	0	-1.158	0	0
456	17	M6	max	-6.803	0	5.112	0	0	15.67	0	15.67	0	15.67	0	15.67
457			min	-7.228	15.67	-5.112	15.67	0	0	0	0	0	-20.028	7.835	
458	17	M10	max	-4.183	0	0	15.67	0	15.67	0	15.67	0	15.67	0	15.67
459			min	-4.692	15.67	0	0	0	0	0	0	0	0	0	0
460	17	M7	max	-11.176	0	0.051	0	0	11.439	0	11.439	0	11.439	0.24	11.439
461			min	-11.312	11.439	-0.093	11.439	0	0	0	0	0	-0.104	4.051	
462	17	M8	max	18.877	10.961	0.091	10.961	0	10.961	0	10.961	0	10.961	0.071	3.425
463			min	18.741	0	-0.042	0	0	0	0	0	0	-0.272	10.961	
464	17	M9	max	-11.467	0	0.093	0	0	11.439	0	11.439	0	11.439	0.24	0
465			min	-11.603	11.439	-0.051	11.439	0	0	0	0	0	-0.104	7.388	
466	17	M11	max	19.149	10.961	0.042	10.961	0	10.961	0	10.961	0	10.961	0.071	7.536
467			min	19.013	0	-0.091	0	0	0	0	0	0	-0.272	0	0

Maximum Member Section Forces (Continued)

LC	Member Label		Axial[k]	Loc[ft]	y Shear[k]	Loc[ft]	z Shear[k]	Loc[ft]	Torque[k-ft]	Loc[ft]	y-y Moment[k-ft]	Loc[ft]	z-z Moment[k-ft]	Loc[ft]
468	17	M12	max	11.085	11.439	0.072	11.439	0	11.439	0	11.439	0	0.206	5.72
469			min	10.949	0	-0.072	0	0	0	0	0	0	0	0
470	17	M13	max	11.418	11.439	0.072	11.439	0	11.439	0	11.439	0	0.206	5.72
471			min	11.282	0	-0.072	0	0	0	0	0	0	0	0
472	17	M14	max	-17.528	0	0.066	0	0	10.961	0	10.961	0	0	10.961
473			min	-17.664	10.961	-0.066	10.961	0	0	0	0	0	-0.182	5.48
474	17	M15	max	-17.837	0	0.066	0	0	10.961	0	10.961	0	0	10.961
475			min	-17.973	10.961	-0.066	10.961	0	0	0	0	0	-0.182	5.48
476	18	M1	max	8.46	15.33	0.369	15.33	0	15.33	0	15.33	0	0.602	5.589
477			min	8.46	0	-0.214	0	0	0	0	0	0	-1.189	15.33
478	18	M2	max	5.531	16.67	0.246	16.67	0	16.67	0	16.67	0	0.794	10.245
479			min	5.531	0	-0.389	0	0	0	0	0	0	-1.189	0
480	18	M4	max	1.45	15.33	0.37	15.33	0	15.33	0	15.33	0	0.598	5.589
481			min	1.45	0	-0.213	0	0	0	0	0	0	-1.202	15.33
482	18	M5	max	4.301	16.67	0.245	16.67	0	16.67	0	16.67	0	0.789	10.245
483			min	4.301	0	-0.389	0	0	0	0	0	0	-1.202	0
484	18	M6	max	-0.469	0	5.68	0	0	15.67	0	15.67	0	0	15.67
485			min	-0.941	15.67	-5.68	15.67	0	0	0	0	0	-22.253	7.835
486	18	M10	max	-1.204	0	0	15.67	0	15.67	0	15.67	0	0	15.67
487			min	-1.769	15.67	0	0	0	0	0	0	0	0	0
488	18	M7	max	0.261	0	0.06	0	0	11.439	0	11.439	0	0.229	11.439
489			min	0.11	11.439	-0.1	11.439	0	0	0	0	0	-0.129	4.29
490	18	M8	max	4.008	10.961	0.093	10.961	0	10.961	0	10.961	0	0.111	4.11
491			min	3.857	0	-0.055	0	0	0	0	0	0	-0.21	10.961
492	18	M9	max	-0.063	0	0.1	0	0	11.439	0	11.439	0	0.229	0
493			min	-0.214	11.439	-0.06	11.439	0	0	0	0	0	-0.129	7.15
494	18	M11	max	4.302	10.961	0.055	10.961	0	10.961	0	10.961	0	0.111	6.851
495			min	4.151	0	-0.093	0	0	0	0	0	0	-0.21	0
496	18	M12	max	1.968	11.439	0.08	11.439	0	11.439	0	11.439	0	0.229	5.72
497			min	1.818	0	-0.08	0	0	0	0	0	0	0	0
498	18	M13	max	2.33	11.439	0.08	11.439	0	11.439	0	11.439	0	0.229	5.72
499			min	2.179	0	-0.08	0	0	0	0	0	0	0	0
500	18	M14	max	-1.763	0	0.074	0	0	10.961	0	10.961	0	0	10.961
501			min	-1.914	10.961	-0.074	10.961	0	0	0	0	0	-0.202	5.48
502	18	M15	max	-2.097	0	0.074	0	0	10.961	0	10.961	0	0	10.961
503			min	-2.247	10.961	-0.074	10.961	0	0	0	0	0	-0.202	5.48
504	19	M1	max	3.379	15.33	0	15.33	0	15.33	0	15.33	0	0.003	15.33
505			min	3.379	0	0	0	0	0	0	0	0	0	0
506	19	M2	max	0.034	16.67	0	16.67	0	16.67	0	16.67	0	0.003	0
507			min	0.034	0	0	0	0	0	0	0	0	0	16.67
508	19	M4	max	3.379	15.33	0	15.33	0	15.33	0	15.33	0	0	0
509			min	3.379	0	0	0	0	0	0	0	0	-0.003	15.33
510	19	M5	max	0.034	16.67	0	16.67	0	16.67	0	16.67	0	0	16.67
511			min	0.034	0	0	0	0	0	0	0	0	-0.003	0
512	19	M6	max	0.032	15.67	0	15.67	0	15.67	0	15.67	0	0	15.67
513			min	0.032	0	0	0	0	0	0	0	0	0	0
514	19	M10	max	-0.518	15.67	3.917	0	0	15.67	0	15.67	0	0	15.67
515			min	-0.518	0	-3.918	15.67	0	0	0	0	0	-15.347	7.835
516	19	M7	max	-0.047	11.439	0	11.439	0	11.439	0	11.439	0	0	0
517			min	-0.047	0	0	0	0	0	0	0	0	-0.001	11.439
518	19	M8	max	0.77	10.961	0	10.961	0	10.961	0	10.961	0	0.001	10.961
519			min	0.77	0	0	0	0	0	0	0	0	0	0
520	19	M9	max	-0.047	11.439	0	11.439	0	11.439	0	11.439	0	0	11.439
521			min	-0.047	0	0	0	0	0	0	0	0	-0.001	0
522	19	M11	max	0.77	10.961	0	10.961	0	10.961	0	10.961	0	0.001	0
523			min	0.77	0	0	0	0	0	0	0	0	0	10.961
524	19	M12	max	-0.047	11.439	0	11.439	0	11.439	0	11.439	0	0	11.439
525			min	-0.047	0	0	0	0	0	0	0	0	0	0
526	19	M13	max	-0.047	11.439	0	11.439	0	11.439	0	11.439	0	0	11.439
527			min	-0.047	0	0	0	0	0	0	0	0	0	0
528	19	M14	max	0.77	10.961	0	10.961	0	10.961	0	10.961	0	0	10.961
529			min	0.77	0	0	0	0	0	0	0	0	0	0
530	19	M15	max	0.77	10.961	0	10.961	0	10.961	0	10.961	0	0	10.961
531			min	0.77	0	0	0	0	0	0	0	0	0	0
532	20	M1	max	4.953	15.33	0	15.33	0	15.33	0	15.33	0	0.006	15.33
533			min	4.953	0	0	0	0	0	0	0	0	0	0
534	20	M2	max	4.916	16.67	0	16.67	0	16.67	0	16.67	0	0.006	0
535			min	4.916	0	0	0	0	0	0	0	0	0	16.67

Maximum Member Section Forces (Continued)

	LC	Member Label		Axial[k]	Loc[ft]	y Shear[k]	Loc[ft]	z Shear[k]	Loc[ft]	Torque[k-ft]	Loc[ft]	y-y Moment[k-ft]	Loc[ft]	z-z Moment[k-ft]	Loc[ft]
536	20	M4	max	4.953	15.33	0	15.33	0	15.33	0	15.33	0	15.33	0	0
537			min	4.953	0	0	0	0	0	0	0	0	0	-0.006	15.33
538	20	M5	max	4.916	16.67	0	16.67	0	16.67	0	16.67	0	16.67	0	16.67
539			min	4.916	0	0	0	0	0	0	0	0	0	-0.006	0
540	20	M6	max	-0.719	15.67	5.68	0	0	15.67	0	15.67	0	15.67	0	15.67
541			min	-0.719	0	-5.68	15.67	0	0	0	0	0	0	-22.253	7.835
542	20	M10	max	-1.461	15.67	0	15.67	0	15.67	0	15.67	0	15.67	0	15.67
543			min	-1.461	0	0	0	0	0	0	0	0	0	0	0
544	20	M7	max	1.05	11.439	0	11.439	0	11.439	0	11.439	0	11.439	0	0
545			min	1.05	0	0	0	0	0	0	0	0	0	-0.001	11.439
546	20	M8	max	1.04	10.961	0	10.961	0	10.961	0	10.961	0	10.961	0.003	10.961
547			min	1.04	0	0	0	0	0	0	0	0	0	0	0
548	20	M9	max	1.05	11.439	0	11.439	0	11.439	0	11.439	0	11.439	0	11.439
549			min	1.05	0	0	0	0	0	0	0	0	0	-0.001	0
550	20	M11	max	1.04	10.961	0	10.961	0	10.961	0	10.961	0	10.961	0.003	0
551			min	1.04	0	0	0	0	0	0	0	0	0	0	10.961
552	20	M12	max	1.05	11.439	0	11.439	0	11.439	0	11.439	0	11.439	0	11.439
553			min	1.05	0	0	0	0	0	0	0	0	0	0	0
554	20	M13	max	1.049	11.439	0	11.439	0	11.439	0	11.439	0	11.439	0	11.439
555			min	1.049	0	0	0	0	0	0	0	0	0	0	0
556	20	M14	max	1.04	10.961	0	10.961	0	10.961	0	10.961	0	10.961	0	10.961
557			min	1.04	0	0	0	0	0	0	0	0	0	0	0
558	20	M15	max	1.04	10.961	0	10.961	0	10.961	0	10.961	0	10.961	0	10.961
559			min	1.04	0	0	0	0	0	0	0	0	0	0	0
560	21	M1	max	-26.247	15.33	-0.005	15.33	0	15.33	0	15.33	0	15.33	0.083	15.33
561			min	-26.247	0	-0.005	0	0	0	0	0	0	0	0	0
562	21	M2	max	-8.315	16.67	0.005	16.67	0	16.67	0	16.67	0	16.67	0.083	0
563			min	-8.315	0	0.005	0	0	0	0	0	0	0	0	16.67
564	21	M4	max	25.771	15.33	-0.005	15.33	0	15.33	0	15.33	0	15.33	0.076	15.33
565			min	25.771	0	-0.005	0	0	0	0	0	0	0	0	0
566	21	M5	max	6.784	16.67	0.005	16.67	0	16.67	0	16.67	0	16.67	0.076	0
567			min	6.784	0	0.005	0	0	0	0	0	0	0	0	16.67
568	21	M6	max	6.382	15.67	0	15.67	0	15.67	0	15.67	0	15.67	0	15.67
569			min	6.382	0	0	0	0	0	0	0	0	0	0	0
570	21	M10	max	3.104	15.67	0	15.67	0	15.67	0	15.67	0	15.67	0	15.67
571			min	3.104	0	0	0	0	0	0	0	0	0	0	0
572	21	M7	max	11.404	11.439	0.003	11.439	0	11.439	0	11.439	0	11.439	0	0
573			min	11.404	0	0.003	0	0	0	0	0	0	0	-0.034	11.439
574	21	M8	max	-15.274	10.961	-0.008	10.961	0	10.961	0	10.961	0	10.961	0.083	10.961
575			min	-15.274	0	-0.008	0	0	0	0	0	0	0	0	0
576	21	M9	max	11.405	11.439	-0.003	11.439	0	11.439	0	11.439	0	11.439	0	11.439
577			min	11.405	0	-0.003	0	0	0	0	0	0	0	-0.034	0
578	21	M11	max	-15.268	10.961	0.008	10.961	0	10.961	0	10.961	0	10.961	0.083	0
579			min	-15.268	0	0.008	0	0	0	0	0	0	0	0	10.961
580	21	M12	max	-9.312	11.439	0	11.439	0	11.439	0	11.439	0	11.439	0	11.439
581			min	-9.312	0	0	0	0	0	0	0	0	0	0	0
582	21	M13	max	-9.316	11.439	0	11.439	0	11.439	0	11.439	0	11.439	0	11.439
583			min	-9.316	0	0	0	0	0	0	0	0	0	0	0
584	21	M14	max	15.93	10.961	0	10.961	0	10.961	0	10.961	0	10.961	0	10.961
585			min	15.93	0	0	0	0	0	0	0	0	0	0	0
586	21	M15	max	15.95	10.961	0	10.961	0	10.961	0	10.961	0	10.961	0	10.961
587			min	15.95	0	0	0	0	0	0	0	0	0	0	0

Member End Reactions

LC	Member Label	Member End	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
0	1	M1	I	8.46	-0.214	0	0	0
1			J	8.46	0.369	0	0	-1.189
2	1	M2	I	5.531	-0.389	0	0	-1.189
3			J	5.531	0.246	0	0	0
4	1	M4	I	1.45	-0.213	0	0	0
5			J	1.45	0.37	0	0	-1.202
6	1	M5	I	4.301	-0.389	0	0	-1.202
7			J	4.301	0.245	0	0	0
8	1	M6	I	-0.469	5.68	0	0	0
9			J	-0.941	-5.68	0	0	0
10	1	M10	I	-1.204	0	0	0	0
11			J	-1.769	0	0	0	0
12	1	M7	I	0.261	0.06	0	0	0

Member End Reactions (Continued)

LC	Member Label	Member End	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
13		J	0.11	-0.1	0	0	0	0.229
14	1	M8	3.857	-0.055	0	0	0	0
15		J	4.008	0.093	0	0	0	-0.21
16	1	M9	-0.063	0.1	0	0	0	0.229
17		J	-0.214	-0.06	0	0	0	0
18	1	M11	4.151	-0.093	0	0	0	-0.21
19		J	4.302	0.055	0	0	0	0
20	1	M12	1.818	-0.08	0	0	0	0
21		J	1.968	0.08	0	0	0	0
22	1	M13	2.179	-0.08	0	0	0	0
23		J	2.33	0.08	0	0	0	0
24	1	M14	-1.763	0.074	0	0	0	0
25		J	-1.914	-0.074	0	0	0	0
26	1	M15	-2.097	0.074	0	0	0	0
27		J	-2.247	-0.074	0	0	0	0
28	2	M1	3.379	0	0	0	0	0
29		J	3.379	0	0	0	0	0.003
30	2	M2	0.034	0	0	0	0	0.003
31		J	0.034	0	0	0	0	0
32	2	M4	3.379	0	0	0	0	0
33		J	3.379	0	0	0	0	-0.003
34	2	M5	0.034	0	0	0	0	-0.003
35		J	0.034	0	0	0	0	0
36	2	M6	0.032	0	0	0	0	0
37		J	0.032	0	0	0	0	0
38	2	M10	-0.518	3.917	0	0	0	0
39		J	-0.518	-3.918	0	0	0	0
40	2	M7	-0.047	0	0	0	0	0
41		J	-0.047	0	0	0	0	-0.001
42	2	M8	0.77	0	0	0	0	0
43		J	0.77	0	0	0	0	0.001
44	2	M9	-0.047	0	0	0	0	-0.001
45		J	-0.047	0	0	0	0	0
46	2	M11	0.77	0	0	0	0	0.001
47		J	0.77	0	0	0	0	0
48	2	M12	-0.047	0	0	0	0	0
49		J	-0.047	0	0	0	0	0
50	2	M13	-0.047	0	0	0	0	0
51		J	-0.047	0	0	0	0	0
52	2	M14	0.77	0	0	0	0	0
53		J	0.77	0	0	0	0	0
54	2	M15	0.77	0	0	0	0	0
55		J	0.77	0	0	0	0	0
56	3	M1	11.839	-0.214	0	0	0	0
57		J	11.839	0.369	0	0	0	-1.186
58	3	M2	5.565	-0.388	0	0	0	-1.186
59		J	5.565	0.246	0	0	0	0
60	3	M4	4.829	-0.213	0	0	0	0
61		J	4.829	0.37	0	0	0	-1.206
62	3	M5	4.335	-0.39	0	0	0	-1.206
63		J	4.335	0.245	0	0	0	0
64	3	M6	-0.437	5.68	0	0	0	0
65		J	-0.909	-5.68	0	0	0	0
66	3	M10	-1.722	3.917	0	0	0	0
67		J	-2.287	-3.918	0	0	0	0
68	3	M7	0.214	0.06	0	0	0	0
69		J	0.064	-0.1	0	0	0	0.229
70	3	M8	4.627	-0.055	0	0	0	0
71		J	4.778	0.093	0	0	0	-0.209
72	3	M9	-0.11	0.1	0	0	0	0.229
73		J	-0.26	-0.06	0	0	0	0
74	3	M11	4.922	-0.093	0	0	0	-0.209
75		J	5.073	0.055	0	0	0	0
76	3	M12	1.771	-0.08	0	0	0	0
77		J	1.922	0.08	0	0	0	0
78	3	M13	2.132	-0.08	0	0	0	0
79		J	2.283	0.08	0	0	0	0
80	3	M14	-0.994	0.074	0	0	0	0

Member End Reactions (Continued)

	LC	Member Label	Member End	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
81			J	-1.144	-0.074	0	0	0	0
82	3	M15	I	-1.327	0.074	0	0	0	0
83			J	-1.478	-0.074	0	0	0	0
84	4	M1	I	11.844	-0.3	0	0	0	0
85			J	11.844	0.517	0	0	0	-1.665
86	4	M2	I	7.744	-0.544	0	0	0	-1.665
87			J	7.744	0.344	0	0	0	0
88	4	M4	I	2.03	-0.299	0	0	0	0
89			J	2.03	0.518	0	0	0	-1.683
90	4	M5	I	6.021	-0.545	0	0	0	-1.683
91			J	6.021	0.343	0	0	0	0
92	4	M6	I	-0.657	7.953	0	0	0	0
93			J	-1.317	-7.953	0	0	0	0
94	4	M10	I	-1.685	0	0	0	0	0
95			J	-2.477	0	0	0	0	0
96	4	M7	I	0.365	0.084	0	0	0	0
97			J	0.154	-0.14	0	0	0	0.321
98	4	M8	I	5.4	-0.076	0	0	0	0
99			J	5.611	0.13	0	0	0	-0.294
100	4	M9	I	-0.088	0.14	0	0	0	0.321
101			J	-0.3	-0.084	0	0	0	0
102	4	M11	I	5.812	-0.13	0	0	0	-0.294
103			J	6.023	0.076	0	0	0	0
104	4	M12	I	2.545	-0.112	0	0	0	0
105			J	2.756	0.112	0	0	0	0
106	4	M13	I	3.051	-0.112	0	0	0	0
107			J	3.262	0.112	0	0	0	0
108	4	M14	I	-2.469	0.103	0	0	0	0
109			J	-2.68	-0.103	0	0	0	0
110	4	M15	I	-2.936	0.103	0	0	0	0
111			J	-3.147	-0.103	0	0	0	0
112	5	M1	I	18.037	-0.258	0	0	0	0
113			J	18.037	0.443	0	0	0	-1.419
114	5	M2	I	9.15	-0.466	0	0	0	-1.419
115			J	9.15	0.296	0	0	0	0
116	5	M4	I	9.621	-0.255	0	0	0	0
117			J	9.621	0.445	0	0	0	-1.451
118	5	M5	I	7.673	-0.468	0	0	0	-1.451
119			J	7.673	0.294	0	0	0	0
120	5	M6	I	-0.872	9.657	0	0	0	0
121			J	-1.438	-9.657	0	0	0	0
122	5	M10	I	-3.004	6.268	0	0	0	0
123			J	-3.682	-6.268	0	0	0	0
124	5	M7	I	0.763	0.072	0	0	0	0
125			J	0.582	-0.12	0	0	0	0.273
126	5	M8	I	6.382	-0.066	0	0	0	0
127			J	6.563	0.111	0	0	0	-0.25
128	5	M9	I	0.374	0.12	0	0	0	0.273
129			J	0.193	-0.072	0	0	0	0
130	5	M11	I	6.735	-0.111	0	0	0	-0.25
131			J	6.916	0.066	0	0	0	0
132	5	M12	I	2.632	-0.096	0	0	0	0
133			J	2.813	0.096	0	0	0	0
134	5	M13	I	3.065	-0.096	0	0	0	0
135			J	3.246	0.096	0	0	0	0
136	5	M14	I	-0.366	0.089	0	0	0	0
137			J	-0.547	-0.089	0	0	0	0
138	5	M15	I	-0.765	0.089	0	0	0	0
139			J	-0.946	-0.089	0	0	0	0
140	6	M1	I	15.559	-0.257	0	0	0	0
141			J	15.559	0.443	0	0	0	-1.422
142	6	M2	I	6.692	-0.466	0	0	0	-1.422
143			J	6.692	0.295	0	0	0	0
144	6	M4	I	7.146	-0.256	0	0	0	0
145			J	7.146	0.445	0	0	0	-1.448
146	6	M5	I	5.216	-0.468	0	0	0	-1.448
147			J	5.216	0.294	0	0	0	0
148	6	M6	I	-0.512	6.816	0	0	0	0

Member End Reactions (Continued)

	LC	Member Label	Member End	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
149			J	-1.078	-6.816	0	0	0	0
150	6	M10	I	-2.274	6.268	0	0	0	0
151			J	-2.952	-6.268	0	0	0	0
152	6	M7	I	0.238	0.072	0	0	0	0
153			J	0.057	-0.12	0	0	0	0.274
154	6	M8	I	5.861	-0.066	0	0	0	0
155			J	6.042	0.111	0	0	0	-0.251
156	6	M9	I	-0.15	0.12	0	0	0	0.274
157			J	-0.331	-0.072	0	0	0	0
158	6	M11	I	6.215	-0.111	0	0	0	-0.251
159			J	6.396	0.066	0	0	0	0
160	6	M12	I	2.107	-0.096	0	0	0	0
161			J	2.288	0.096	0	0	0	0
162	6	M13	I	2.54	-0.096	0	0	0	0
163			J	2.721	0.096	0	0	0	0
164	6	M14	I	-0.885	0.089	0	0	0	0
165			J	-1.066	-0.089	0	0	0	0
166	6	M15	I	-1.285	0.089	0	0	0	0
167			J	-1.466	-0.089	0	0	0	0
168	7	M1	I	19.77	-0.258	0	0	0	0
169			J	19.77	0.442	0	0	0	-1.415
170	7	M2	I	14.521	-0.466	0	0	0	-1.415
171			J	14.521	0.296	0	0	0	0
172	7	M4	I	11.352	-0.255	0	0	0	0
173			J	11.352	0.445	0	0	0	-1.454
174	7	M5	I	13.042	-0.468	0	0	0	-1.454
175			J	13.042	0.293	0	0	0	0
176	7	M6	I	-1.698	15.905	0	0	0	0
177			J	-2.264	-15.905	0	0	0	0
178	7	M10	I	-4.042	1.959	0	0	0	0
179			J	-4.72	-1.959	0	0	0	0
180	7	M7	I	1.968	0.072	0	0	0	0
181			J	1.787	-0.12	0	0	0	0.273
182	7	M8	I	6.679	-0.066	0	0	0	0
183			J	6.86	0.111	0	0	0	-0.248
184	7	M9	I	1.579	0.12	0	0	0	0.273
185			J	1.398	-0.072	0	0	0	0
186	7	M11	I	7.032	-0.111	0	0	0	-0.248
187			J	7.213	0.066	0	0	0	0
188	7	M12	I	3.838	-0.096	0	0	0	0
189			J	4.019	0.096	0	0	0	0
190	7	M13	I	4.272	-0.096	0	0	0	0
191			J	4.453	0.096	0	0	0	0
192	7	M14	I	-0.069	0.089	0	0	0	0
193			J	-0.25	-0.089	0	0	0	0
194	7	M15	I	-0.469	0.089	0	0	0	0
195			J	-0.65	-0.089	0	0	0	0
196	8	M1	I	4.945	-0.26	0	0	0	0
197			J	4.945	0.44	0	0	0	-1.375
198	8	M2	I	10.343	-0.463	0	0	0	-1.375
199			J	10.343	0.298	0	0	0	0
200	8	M4	I	22.562	-0.258	0	0	0	0
201			J	22.562	0.442	0	0	0	-1.414
202	8	M5	I	16.423	-0.466	0	0	0	-1.414
203			J	16.423	0.296	0	0	0	0
204	8	M6	I	1.477	15.905	0	0	0	0
205			J	0.911	-15.905	0	0	0	0
206	8	M10	I	-2.232	0	0	0	0	0
207			J	-2.91	0	0	0	0	0
208	8	M7	I	7.701	0.074	0	0	0	0
209			J	7.52	-0.119	0	0	0	0.257
210	8	M8	I	-1.348	-0.07	0	0	0	0
211			J	-1.167	0.107	0	0	0	-0.207
212	8	M9	I	7.312	0.119	0	0	0	0.257
213			J	7.131	-0.074	0	0	0	0
214	8	M11	I	-0.994	-0.107	0	0	0	-0.207
215			J	-0.813	0.07	0	0	0	0
216	8	M12	I	-0.801	-0.096	0	0	0	0

Member End Reactions (Continued)

	LC	Member Label	Member End	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
217			J	-0.62	0.096	0	0	0	0
218	8	M13	I	-0.369	-0.096	0	0	0	0
219			J	-0.188	0.096	0	0	0	0
220	8	M14	I	7.519	0.089	0	0	0	0
221			J	7.338	-0.089	0	0	0	0
222	8	M15	I	7.127	0.089	0	0	0	0
223			J	6.946	-0.089	0	0	0	0
224	9	M1	I	31.21	-0.255	0	0	0	0
225			J	31.21	0.445	0	0	0	-1.459
226	9	M2	I	18.661	-0.468	0	0	0	-1.459
227			J	18.661	0.293	0	0	0	0
228	9	M4	I	-3.237	-0.253	0	0	0	0
229			J	-3.237	0.447	0	0	0	-1.491
230	9	M5	I	9.628	-0.47	0	0	0	-1.491
231			J	9.628	0.291	0	0	0	0
232	9	M6	I	-4.904	15.905	0	0	0	0
233			J	-5.471	-15.905	0	0	0	0
234	9	M10	I	-5.333	0	0	0	0	0
235			J	-6.011	0	0	0	0	0
236	9	M7	I	-3.719	0.071	0	0	0	0
237			J	-3.9	-0.122	0	0	0	0.291
238	9	M8	I	13.934	-0.062	0	0	0	0
239			J	14.115	0.115	0	0	0	-0.29
240	9	M9	I	-4.107	0.122	0	0	0	0.291
241			J	-4.288	-0.071	0	0	0	0
242	9	M11	I	14.289	-0.115	0	0	0	-0.29
243			J	14.47	0.062	0	0	0	0
244	9	M12	I	8.524	-0.096	0	0	0	0
245			J	8.705	0.096	0	0	0	0
246	9	M13	I	8.961	-0.096	0	0	0	0
247			J	9.142	0.096	0	0	0	0
248	9	M14	I	-8.428	0.089	0	0	0	0
249			J	-8.609	-0.089	0	0	0	0
250	9	M15	I	-8.833	0.089	0	0	0	0
251			J	-9.014	-0.089	0	0	0	0
252	10	M1	I	-2.975	-0.26	0	0	0	0
253			J	-2.975	0.44	0	0	0	-1.386
254	10	M2	I	2.48	-0.464	0	0	0	-1.386
255			J	2.48	0.298	0	0	0	0
256	10	M4	I	14.632	-0.258	0	0	0	0
257			J	14.632	0.442	0	0	0	-1.404
258	10	M5	I	8.556	-0.465	0	0	0	-1.404
259			J	8.556	0.296	0	0	0	0
260	10	M6	I	2.628	6.816	0	0	0	0
261			J	2.062	-6.816	0	0	0	0
262	10	M10	I	0.107	0	0	0	0	0
263			J	-0.572	0	0	0	0	0
264	10	M7	I	6.019	0.074	0	0	0	0
265			J	5.838	-0.119	0	0	0	0.258
266	10	M8	I	-3.01	-0.069	0	0	0	0
267			J	-2.829	0.108	0	0	0	-0.211
268	10	M9	I	5.63	0.119	0	0	0	0.258
269			J	5.449	-0.074	0	0	0	0
270	10	M11	I	-2.656	-0.108	0	0	0	-0.211
271			J	-2.475	0.069	0	0	0	0
272	10	M12	I	-2.477	-0.096	0	0	0	0
273			J	-2.296	0.096	0	0	0	0
274	10	M13	I	-2.046	-0.096	0	0	0	0
275			J	-1.865	0.096	0	0	0	0
276	10	M14	I	5.853	0.089	0	0	0	0
277			J	5.672	-0.089	0	0	0	0
278	10	M15	I	5.461	0.089	0	0	0	0
279			J	5.28	-0.089	0	0	0	0
280	11	M1	I	23.274	-0.254	0	0	0	0
281			J	23.274	0.446	0	0	0	-1.469
282	11	M2	I	10.792	-0.469	0	0	0	-1.469
283			J	10.792	0.293	0	0	0	0
284	11	M4	I	-11.151	-0.253	0	0	0	0

Member End Reactions (Continued)

LC	Member Label	Member End	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
285		J	-11.151	0.447	0	0	0	-1.481
286	11	M5	1.767	-0.47	0	0	0	-1.481
287		J	1.767	0.292	0	0	0	0
288	11	M6	-3.753	6.816	0	0	0	0
289		J	-4.32	-6.816	0	0	0	0
290	11	M10	-2.995	0	0	0	0	0
291		J	-3.673	0	0	0	0	0
292	11	M7	-5.393	0.071	0	0	0	0
293		J	-5.574	-0.122	0	0	0	0.292
294	11	M8	12.265	-0.062	0	0	0	0
295		J	12.446	0.115	0	0	0	-0.294
296	11	M9	-5.782	0.122	0	0	0	0.292
297		J	-5.963	-0.071	0	0	0	0
298	11	M11	12.62	-0.115	0	0	0	-0.294
299		J	12.801	0.062	0	0	0	0
300	11	M12	6.839	-0.096	0	0	0	0
301		J	7.02	0.096	0	0	0	0
302	11	M13	7.276	-0.096	0	0	0	0
303		J	7.457	0.096	0	0	0	0
304	11	M14	-10.087	0.089	0	0	0	0
305		J	-10.268	-0.089	0	0	0	0
306	11	M15	-10.492	0.089	0	0	0	0
307		J	-10.673	-0.089	0	0	0	0
308	12	M1	-11.944	-0.263	0	0	0	0
309		J	-11.944	0.437	0	0	0	-1.339
310	12	M2	0.793	-0.461	0	0	0	-1.339
311		J	0.793	0.3	0	0	0	0
312	12	M4	31.695	-0.261	0	0	0	0
313		J	31.695	0.44	0	0	0	-1.371
314	12	M5	14.426	-0.463	0	0	0	-1.371
315		J	14.426	0.298	0	0	0	0
316	12	M6	5.475	9.657	0	0	0	0
317		J	4.909	-9.657	0	0	0	0
318	12	M10	0.669	1.959	0	0	0	0
319		J	-0.009	-1.959	0	0	0	0
320	12	M7	12.227	0.075	0	0	0	0
321		J	12.046	-0.117	0	0	0	0.241
322	12	M8	-9.747	-0.073	0	0	0	0
323		J	-9.566	0.104	0	0	0	-0.168
324	12	M9	11.839	0.117	0	0	0	0.241
325		J	11.658	-0.075	0	0	0	0
326	12	M11	-9.389	-0.104	0	0	0	-0.168
327		J	-9.208	0.073	0	0	0	0
328	12	M12	-6.637	-0.096	0	0	0	0
329		J	-6.456	0.096	0	0	0	0
330	12	M13	-6.207	-0.096	0	0	0	0
331		J	-6.026	0.096	0	0	0	0
332	12	M14	14.728	0.089	0	0	0	0
333		J	14.547	-0.089	0	0	0	0
334	12	M15	14.346	0.089	0	0	0	0
335		J	14.165	-0.089	0	0	0	0
336	13	M1	40.565	-0.252	0	0	0	0
337		J	40.565	0.448	0	0	0	-1.506
338	13	M2	17.419	-0.471	0	0	0	-1.506
339		J	17.419	0.29	0	0	0	0
340	13	M4	-19.882	-0.251	0	0	0	0
341		J	-19.882	0.449	0	0	0	-1.524
342	13	M5	0.846	-0.472	0	0	0	-1.524
343		J	0.846	0.289	0	0	0	0
344	13	M6	-7.288	9.657	0	0	0	0
345		J	-7.854	-9.657	0	0	0	0
346	13	M10	-5.534	1.959	0	0	0	0
347		J	-6.212	-1.959	0	0	0	0
348	13	M7	-10.601	0.069	0	0	0	0
349		J	-10.782	-0.123	0	0	0	0.308
350	13	M8	20.809	-0.058	0	0	0	0
351		J	20.99	0.119	0	0	0	-0.333
352	13	M9	-10.989	0.123	0	0	0	0.308

Member End Reactions (Continued)

LC	Member Label	Member End	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
353		J	-11.17	-0.069	0	0	0	0
354	13	M11	21.169	-0.119	0	0	0	-0.333
355		J	21.35	0.058	0	0	0	0
356	13	M12	12.001	-0.096	0	0	0	0
357		J	12.182	0.096	0	0	0	0
358	13	M13	12.442	-0.096	0	0	0	0
359		J	12.623	0.096	0	0	0	0
360	13	M14	-17.159	0.089	0	0	0	0
361		J	-17.34	-0.089	0	0	0	0
362	13	M15	-17.567	0.089	0	0	0	0
363		J	-17.748	-0.089	0	0	0	0
364	14	M1	-14.417	-0.263	0	0	0	0
365		J	-14.417	0.438	0	0	0	-1.342
366	14	M2	-1.663	-0.461	0	0	0	-1.342
367		J	-1.663	0.3	0	0	0	0
368	14	M4	29.214	-0.261	0	0	0	0
369		J	29.214	0.439	0	0	0	-1.368
370	14	M5	11.967	-0.463	0	0	0	-1.368
371		J	11.967	0.299	0	0	0	0
372	14	M6	5.835	6.816	0	0	0	0
373		J	5.269	-6.816	0	0	0	0
374	14	M10	1.4	1.959	0	0	0	0
375		J	0.722	-1.959	0	0	0	0
376	14	M7	11.7	0.075	0	0	0	0
377		J	11.519	-0.117	0	0	0	0.241
378	14	M8	-10.266	-0.073	0	0	0	0
379		J	-10.085	0.104	0	0	0	-0.169
380	14	M9	11.312	0.117	0	0	0	0.241
381		J	11.131	-0.075	0	0	0	0
382	14	M11	-9.908	-0.104	0	0	0	-0.169
383		J	-9.727	0.073	0	0	0	0
384	14	M12	-7.16	-0.096	0	0	0	0
385		J	-6.979	0.096	0	0	0	0
386	14	M13	-6.73	-0.096	0	0	0	0
387		J	-6.549	0.096	0	0	0	0
388	14	M14	14.207	0.089	0	0	0	0
389		J	14.026	-0.089	0	0	0	0
390	14	M15	13.825	0.089	0	0	0	0
391		J	13.644	-0.089	0	0	0	0
392	15	M1	38.082	-0.252	0	0	0	0
393		J	38.082	0.449	0	0	0	-1.509
394	15	M2	14.959	-0.471	0	0	0	-1.509
395		J	14.959	0.29	0	0	0	0
396	15	M4	-22.353	-0.251	0	0	0	0
397		J	-22.353	0.449	0	0	0	-1.521
398	15	M5	-1.61	-0.472	0	0	0	-1.521
399		J	-1.61	0.289	0	0	0	0
400	15	M6	-6.928	6.816	0	0	0	0
401		J	-7.494	-6.816	0	0	0	0
402	15	M10	-4.803	1.959	0	0	0	0
403		J	-5.482	-1.959	0	0	0	0
404	15	M7	-11.123	0.069	0	0	0	0
405		J	-11.304	-0.123	0	0	0	0.308
406	15	M8	20.287	-0.058	0	0	0	0
407		J	20.467	0.119	0	0	0	-0.335
408	15	M9	-11.511	0.123	0	0	0	0.308
409		J	-11.692	-0.069	0	0	0	0
410	15	M11	20.647	-0.119	0	0	0	-0.335
411		J	20.828	0.058	0	0	0	0
412	15	M12	11.473	-0.096	0	0	0	0
413		J	11.654	0.096	0	0	0	0
414	15	M13	11.914	-0.096	0	0	0	0
415		J	12.095	0.096	0	0	0	0
416	15	M14	-17.676	0.089	0	0	0	0
417		J	-17.857	-0.089	0	0	0	0
418	15	M15	-18.084	0.089	0	0	0	0
419		J	-18.265	-0.089	0	0	0	0
420	16	M1	-18.641	-0.198	0	0	0	0

Member End Reactions (Continued)

LC	Member Label	Member End	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
421		J	-18.641	0.327	0	0	0	-0.987
422	16	M2	-3.339	-0.345	0	0	0	-0.987
423		J	-3.339	0.226	0	0	0	0
424	16	M4	27.086	-0.197	0	0	0	0
425		J	27.086	0.328	0	0	0	-1.006
426	16	M5	10.659	-0.346	0	0	0	-1.006
427		J	10.659	0.225	0	0	0	0
428	16	M6	5.96	5.112	0	0	0	0
429		J	5.535	-5.112	0	0	0	0
430	16	M10	2.02	0	0	0	0	0
431		J	1.511	0	0	0	0	0
432	16	M7	11.644	0.057	0	0	0	0
433		J	11.508	-0.087	0	0	0	0.173
434	16	M8	-11.806	-0.057	0	0	0	0
435		J	-11.67	0.076	0	0	0	-0.107
436	16	M9	11.353	0.087	0	0	0	0.173
437		J	11.218	-0.057	0	0	0	0
438	16	M11	-11.536	-0.076	0	0	0	-0.107
439		J	-11.4	0.057	0	0	0	0
440	16	M12	-7.68	-0.072	0	0	0	0
441		J	-7.545	0.072	0	0	0	0
442	16	M13	-7.359	-0.072	0	0	0	0
443		J	-7.223	0.072	0	0	0	0
444	16	M14	14.348	0.066	0	0	0	0
445		J	14.212	-0.066	0	0	0	0
446	16	M15	14.066	0.066	0	0	0	0
447		J	13.931	-0.066	0	0	0	0
448	17	M1	33.851	-0.187	0	0	0	0
449		J	33.851	0.338	0	0	0	-1.154
450	17	M2	13.282	-0.355	0	0	0	-1.154
451		J	13.282	0.216	0	0	0	0
452	17	M4	-24.472	-0.187	0	0	0	0
453		J	-24.472	0.338	0	0	0	-1.158
454	17	M5	-2.916	-0.355	0	0	0	-1.158
455		J	-2.916	0.216	0	0	0	0
456	17	M6	-6.803	5.112	0	0	0	0
457		J	-7.228	-5.112	0	0	0	0
458	17	M10	-4.183	0	0	0	0	0
459		J	-4.692	0	0	0	0	0
460	17	M7	-11.176	0.051	0	0	0	0
461		J	-11.312	-0.093	0	0	0	0.24
462	17	M8	18.741	-0.042	0	0	0	0
463		J	18.877	0.091	0	0	0	-0.272
464	17	M9	-11.467	0.093	0	0	0	0.24
465		J	-11.603	-0.051	0	0	0	0
466	17	M11	19.013	-0.091	0	0	0	-0.272
467		J	19.149	0.042	0	0	0	0
468	17	M12	10.949	-0.072	0	0	0	0
469		J	11.085	0.072	0	0	0	0
470	17	M13	11.282	-0.072	0	0	0	0
471		J	11.418	0.072	0	0	0	0
472	17	M14	-17.528	0.066	0	0	0	0
473		J	-17.664	-0.066	0	0	0	0
474	17	M15	-17.837	0.066	0	0	0	0
475		J	-17.973	-0.066	0	0	0	0
476	18	M1	8.46	-0.214	0	0	0	0
477		J	8.46	0.369	0	0	0	-1.189
478	18	M2	5.531	-0.389	0	0	0	-1.189
479		J	5.531	0.246	0	0	0	0
480	18	M4	1.45	-0.213	0	0	0	0
481		J	1.45	0.37	0	0	0	-1.202
482	18	M5	4.301	-0.389	0	0	0	-1.202
483		J	4.301	0.245	0	0	0	0
484	18	M6	-0.469	5.68	0	0	0	0
485		J	-0.941	-5.68	0	0	0	0
486	18	M10	-1.204	0	0	0	0	0
487		J	-1.769	0	0	0	0	0
488	18	M7	0.261	0.06	0	0	0	0

Member End Reactions (Continued)

LC	Member Label	Member End	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
489		J	0.11	-0.1	0	0	0	0.229
490	18	M8	3.857	-0.055	0	0	0	0
491		J	4.008	0.093	0	0	0	-0.21
492	18	M9	-0.063	0.1	0	0	0	0.229
493		J	-0.214	-0.06	0	0	0	0
494	18	M11	4.151	-0.093	0	0	0	-0.21
495		J	4.302	0.055	0	0	0	0
496	18	M12	1.818	-0.08	0	0	0	0
497		J	1.968	0.08	0	0	0	0
498	18	M13	2.179	-0.08	0	0	0	0
499		J	2.33	0.08	0	0	0	0
500	18	M14	-1.763	0.074	0	0	0	0
501		J	-1.914	-0.074	0	0	0	0
502	18	M15	-2.097	0.074	0	0	0	0
503		J	-2.247	-0.074	0	0	0	0
504	19	M1	3.379	0	0	0	0	0
505		J	3.379	0	0	0	0	0.003
506	19	M2	0.034	0	0	0	0	0.003
507		J	0.034	0	0	0	0	0
508	19	M4	3.379	0	0	0	0	0
509		J	3.379	0	0	0	0	-0.003
510	19	M5	0.034	0	0	0	0	-0.003
511		J	0.034	0	0	0	0	0
512	19	M6	0.032	0	0	0	0	0
513		J	0.032	0	0	0	0	0
514	19	M10	-0.518	3.917	0	0	0	0
515		J	-0.518	-3.918	0	0	0	0
516	19	M7	-0.047	0	0	0	0	0
517		J	-0.047	0	0	0	0	-0.001
518	19	M8	0.77	0	0	0	0	0
519		J	0.77	0	0	0	0	0.001
520	19	M9	-0.047	0	0	0	0	-0.001
521		J	-0.047	0	0	0	0	0
522	19	M11	0.77	0	0	0	0	0.001
523		J	0.77	0	0	0	0	0
524	19	M12	-0.047	0	0	0	0	0
525		J	-0.047	0	0	0	0	0
526	19	M13	-0.047	0	0	0	0	0
527		J	-0.047	0	0	0	0	0
528	19	M14	0.77	0	0	0	0	0
529		J	0.77	0	0	0	0	0
530	19	M15	0.77	0	0	0	0	0
531		J	0.77	0	0	0	0	0
532	20	M1	4.953	0	0	0	0	0
533		J	4.953	0	0	0	0	0.006
534	20	M2	4.916	0	0	0	0	0.006
535		J	4.916	0	0	0	0	0
536	20	M4	4.953	0	0	0	0	0
537		J	4.953	0	0	0	0	-0.006
538	20	M5	4.916	0	0	0	0	-0.006
539		J	4.916	0	0	0	0	0
540	20	M6	-0.719	5.68	0	0	0	0
541		J	-0.719	-5.68	0	0	0	0
542	20	M10	-1.461	0	0	0	0	0
543		J	-1.461	0	0	0	0	0
544	20	M7	1.05	0	0	0	0	0
545		J	1.05	0	0	0	0	-0.001
546	20	M8	1.04	0	0	0	0	0
547		J	1.04	0	0	0	0	0.003
548	20	M9	1.05	0	0	0	0	-0.001
549		J	1.05	0	0	0	0	0
550	20	M11	1.04	0	0	0	0	0.003
551		J	1.04	0	0	0	0	0
552	20	M12	1.05	0	0	0	0	0
553		J	1.05	0	0	0	0	0
554	20	M13	1.049	0	0	0	0	0
555		J	1.049	0	0	0	0	0
556	20	M14	1.04	0	0	0	0	0

Member End Reactions (Continued)

	LC	Member Label	Member End	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[k-ft]	z-z Moment[k-ft]
557			J	1.04	0	0	0	0	0
558	20	M15	I	1.04	0	0	0	0	0
559			J	1.04	0	0	0	0	0
560	21	M1	I	-26.247	-0.005	0	0	0	0
561			J	-26.247	-0.005	0	0	0	0.083
562	21	M2	I	-8.315	0.005	0	0	0	0.083
563			J	-8.315	0.005	0	0	0	0
564	21	M4	I	25.771	-0.005	0	0	0	0
565			J	25.771	-0.005	0	0	0	0.076
566	21	M5	I	6.784	0.005	0	0	0	0.076
567			J	6.784	0.005	0	0	0	0
568	21	M6	I	6.382	0	0	0	0	0
569			J	6.382	0	0	0	0	0
570	21	M10	I	3.104	0	0	0	0	0
571			J	3.104	0	0	0	0	0
572	21	M7	I	11.404	0.003	0	0	0	0
573			J	11.404	0.003	0	0	0	-0.034
574	21	M8	I	-15.274	-0.008	0	0	0	0
575			J	-15.274	-0.008	0	0	0	0.083
576	21	M9	I	11.405	-0.003	0	0	0	-0.034
577			J	11.405	-0.003	0	0	0	0
578	21	M11	I	-15.268	0.008	0	0	0	0.083
579			J	-15.268	0.008	0	0	0	0
580	21	M12	I	-9.312	0	0	0	0	0
581			J	-9.312	0	0	0	0	0
582	21	M13	I	-9.316	0	0	0	0	0
583			J	-9.316	0	0	0	0	0
584	21	M14	I	15.93	0	0	0	0	0
585			J	15.93	0	0	0	0	0
586	21	M15	I	15.95	0	0	0	0	0
587			J	15.95	0	0	0	0	0

Member 2nd/1st Moment Ratios

	LC	Member	y-y Moment [k-ft]	2nd/1st Ratio	Loc [ft]	z-z Moment [k-ft]	2nd/1st Ratio	Loc [ft]
0	1	M1	0	NC	0	-1.189	1	15.33
1	1	M2	0	NC	0	-1.189	1	0
2	1	M4	0	NC	0	-1.202	1	15.33
3	1	M5	0	NC	0	-1.202	1	0
4	1	M6	0	NC	0	-22.253	1	7.835
5	1	M10	0	NC	0	0	NC	15.67
6	1	M7	0	NC	0	0.229	1	11.439
7	1	M8	0	NC	0	-0.21	1	10.961
8	1	M9	0	NC	0	0.229	1	0
9	1	M11	0	NC	0	-0.21	1	0
10	1	M12	0	NC	0	0.229	1	5.72
11	1	M13	0	NC	0	0.229	1	5.72
12	1	M14	0	NC	0	-0.202	1	5.48
13	1	M15	0	NC	0	-0.202	1	5.48
14	2	M1	0	NC	0	0.003	1	15.33
15	2	M2	0	NC	0	0.003	1	0
16	2	M4	0	NC	0	-0.003	1	15.33
17	2	M5	0	NC	0	-0.003	1	0
18	2	M6	0	NC	0	0	NC	15.67
19	2	M10	0	NC	0	-15.347	1	7.835
20	2	M7	0	NC	0	-0.001	1	11.439
21	2	M8	0	NC	0	0.001	1	10.961
22	2	M9	0	NC	0	-0.001	1	0
23	2	M11	0	NC	0	0.001	1	0
24	2	M12	0	NC	0	0	NC	11.439
25	2	M13	0	NC	0	0	NC	11.439
26	2	M14	0	NC	0	0	NC	0
27	2	M15	0	NC	0	0	NC	0
28	3	M1	0	NC	0	-1.186	1	15.33
29	3	M2	0	NC	0	-1.186	1	0
30	3	M4	0	NC	0	-1.206	1	15.33
31	3	M5	0	NC	0	-1.206	1	0
32	3	M6	0	NC	0	-22.253	1	7.835
33	3	M10	0	NC	0	-15.347	1	7.835

Member 2nd/1st Moment Ratios (Continued)

	LC	Member	y-y Moment [k-ft]	2nd/1st Ratio	Loc [ft]	z-z Moment [k-ft]	2nd/1st Ratio	Loc [ft]
34	3	M7	0	NC	0	0.229	1	11.439
35	3	M8	0	NC	0	-0.209	1	10.961
36	3	M9	0	NC	0	0.229	1	0
37	3	M11	0	NC	0	-0.209	1	0
38	3	M12	0	NC	0	0.229	1	5.72
39	3	M13	0	NC	0	0.229	1	5.72
40	3	M14	0	NC	0	-0.202	1	5.48
41	3	M15	0	NC	0	-0.202	1	5.48
42	4	M1	0	NC	0	-1.665	1	15.33
43	4	M2	0	NC	0	-1.665	1	0
44	4	M4	0	NC	0	-1.683	1	15.33
45	4	M5	0	NC	0	-1.683	1	0
46	4	M6	0	NC	0	-31.154	1	7.835
47	4	M10	0	NC	0	0	NC	15.67
48	4	M7	0	NC	0	0.321	1	11.439
49	4	M8	0	NC	0	-0.294	1	10.961
50	4	M9	0	NC	0	0.321	1	0
51	4	M11	0	NC	0	-0.294	1	0
52	4	M12	0	NC	0	0.321	1	5.72
53	4	M13	0	NC	0	0.321	1	5.72
54	4	M14	0	NC	0	-0.283	1	5.48
55	4	M15	0	NC	0	-0.283	1	5.48
56	5	M1	0	NC	0	-1.419	1	15.33
57	5	M2	0	NC	0	-1.419	1	0
58	5	M4	0	NC	0	-1.451	1	15.33
59	5	M5	0	NC	0	-1.451	1	0
60	5	M6	0	NC	0	-37.83	1	7.835
61	5	M10	0	NC	0	-24.555	1	7.835
62	5	M7	0	NC	0	0.273	1	11.439
63	5	M8	0	NC	0	-0.25	1	10.961
64	5	M9	0	NC	0	0.273	1	0
65	5	M11	0	NC	0	-0.25	1	0
66	5	M12	0	NC	0	0.275	1	5.72
67	5	M13	0	NC	0	0.275	1	5.72
68	5	M14	0	NC	0	-0.243	1	5.48
69	5	M15	0	NC	0	-0.243	1	5.48
70	6	M1	0	NC	0	-1.422	1	15.33
71	6	M2	0	NC	0	-1.422	1	0
72	6	M4	0	NC	0	-1.448	1	15.33
73	6	M5	0	NC	0	-1.448	1	0
74	6	M6	0	NC	0	-26.703	1	7.835
75	6	M10	0	NC	0	-24.555	1	7.835
76	6	M7	0	NC	0	0.274	1	11.439
77	6	M8	0	NC	0	-0.251	1	10.961
78	6	M9	0	NC	0	0.274	1	0
79	6	M11	0	NC	0	-0.251	1	0
80	6	M12	0	NC	0	0.275	1	5.72
81	6	M13	0	NC	0	0.275	1	5.72
82	6	M14	0	NC	0	-0.243	1	5.48
83	6	M15	0	NC	0	-0.243	1	5.48
84	7	M1	0	NC	0	-1.415	1	15.33
85	7	M2	0	NC	0	-1.415	1	0
86	7	M4	0	NC	0	-1.454	1	15.33
87	7	M5	0	NC	0	-1.454	1	0
88	7	M6	0	NC	0	-62.308	1	7.835
89	7	M10	0	NC	0	-7.673	1	7.835
90	7	M7	0	NC	0	0.273	1	11.439
91	7	M8	0	NC	0	-0.248	1	10.961
92	7	M9	0	NC	0	0.273	1	0
93	7	M11	0	NC	0	-0.248	1	0
94	7	M12	0	NC	0	0.275	1	5.72
95	7	M13	0	NC	0	0.275	1	5.72
96	7	M14	0	NC	0	-0.243	1	5.48
97	7	M15	0	NC	0	-0.243	1	5.48
98	8	M1	0	NC	0	-1.375	1	15.33
99	8	M2	0	NC	0	-1.375	1	0
100	8	M4	0	NC	0	-1.414	1	15.33
101	8	M5	0	NC	0	-1.414	1	0

Member 2nd/1st Moment Ratios (Continued)

	LC	Member	y-y Moment [k-ft]	2nd/1st Ratio	Loc [ft]	z-z Moment [k-ft]	2nd/1st Ratio	Loc [ft]
102	8	M6	0	NC	0	-62.308	1	7.835
103	8	M10	0	NC	0	0	NC	15.67
104	8	M7	0	NC	0	0.257	1	11.439
105	8	M8	0	NC	0	-0.207	1	10.961
106	8	M9	0	NC	0	0.257	1	0
107	8	M11	0	NC	0	-0.207	1	0
108	8	M12	0	NC	0	0.275	1	5.72
109	8	M13	0	NC	0	0.275	1	5.72
110	8	M14	0	NC	0	-0.243	1	5.48
111	8	M15	0	NC	0	-0.243	1	5.48
112	9	M1	0	NC	0	-1.459	1	15.33
113	9	M2	0	NC	0	-1.459	1	0
114	9	M4	0	NC	0	-1.491	1	15.33
115	9	M5	0	NC	0	-1.491	1	0
116	9	M6	0	NC	0	-62.308	1	7.835
117	9	M10	0	NC	0	0	NC	15.67
118	9	M7	0	NC	0	0.291	1	11.439
119	9	M8	0	NC	0	-0.29	1	10.961
120	9	M9	0	NC	0	0.291	1	0
121	9	M11	0	NC	0	-0.29	1	0
122	9	M12	0	NC	0	0.275	1	5.72
123	9	M13	0	NC	0	0.275	1	5.72
124	9	M14	0	NC	0	-0.243	1	5.48
125	9	M15	0	NC	0	-0.243	1	5.48
126	10	M1	0	NC	0	-1.386	1	15.33
127	10	M2	0	NC	0	-1.386	1	0
128	10	M4	0	NC	0	-1.404	1	15.33
129	10	M5	0	NC	0	-1.404	1	0
130	10	M6	0	NC	0	-26.703	1	7.835
131	10	M10	0	NC	0	0	NC	15.67
132	10	M7	0	NC	0	0.258	1	11.439
133	10	M8	0	NC	0	-0.211	1	10.961
134	10	M9	0	NC	0	0.258	1	0
135	10	M11	0	NC	0	-0.211	1	0
136	10	M12	0	NC	0	0.275	1	5.72
137	10	M13	0	NC	0	0.275	1	5.72
138	10	M14	0	NC	0	-0.243	1	5.48
139	10	M15	0	NC	0	-0.243	1	5.48
140	11	M1	0	NC	0	-1.469	1	15.33
141	11	M2	0	NC	0	-1.469	1	0
142	11	M4	0	NC	0	-1.481	1	15.33
143	11	M5	0	NC	0	-1.481	1	0
144	11	M6	0	NC	0	-26.703	1	7.835
145	11	M10	0	NC	0	0	NC	15.67
146	11	M7	0	NC	0	0.292	1	11.439
147	11	M8	0	NC	0	-0.294	1	10.961
148	11	M9	0	NC	0	0.292	1	0
149	11	M11	0	NC	0	-0.294	1	0
150	11	M12	0	NC	0	0.275	1	5.72
151	11	M13	0	NC	0	0.275	1	5.72
152	11	M14	0	NC	0	-0.243	1	5.48
153	11	M15	0	NC	0	-0.243	1	5.48
154	12	M1	0	NC	0	-1.339	1	15.33
155	12	M2	0	NC	0	-1.339	1	0
156	12	M4	0	NC	0	-1.371	1	15.33
157	12	M5	0	NC	0	-1.371	1	0
158	12	M6	0	NC	0	-37.83	1	7.835
159	12	M10	0	NC	0	-7.673	1	7.835
160	12	M7	0	NC	0	0.241	1	11.439
161	12	M8	0	NC	0	-0.168	1	10.961
162	12	M9	0	NC	0	0.241	1	0
163	12	M11	0	NC	0	-0.168	1	0
164	12	M12	0	NC	0	0.275	1	5.72
165	12	M13	0	NC	0	0.275	1	5.72
166	12	M14	0	NC	0	-0.243	1	5.48
167	12	M15	0	NC	0	-0.243	1	5.48
168	13	M1	0	NC	0	-1.506	1	15.33
169	13	M2	0	NC	0	-1.506	1	0

Member 2nd/1st Moment Ratios (Continued)

	LC	Member	y-y Moment [k-ft]	2nd/1st Ratio	Loc [ft]	z-z Moment [k-ft]	2nd/1st Ratio	Loc [ft]
170	13	M4	0	NC	0	-1.524	1	15.33
171	13	M5	0	NC	0	-1.524	1	0
172	13	M6	0	NC	0	-37.83	1	7.835
173	13	M10	0	NC	0	-7.673	1	7.835
174	13	M7	0	NC	0	0.308	1	11.439
175	13	M8	0	NC	0	-0.333	1	10.961
176	13	M9	0	NC	0	0.308	1	0
177	13	M11	0	NC	0	-0.333	1	0
178	13	M12	0	NC	0	0.275	1	5.72
179	13	M13	0	NC	0	0.275	1	5.72
180	13	M14	0	NC	0	-0.243	1	5.48
181	13	M15	0	NC	0	-0.243	1	5.48
182	14	M1	0	NC	0	-1.342	1	15.33
183	14	M2	0	NC	0	-1.342	1	0
184	14	M4	0	NC	0	-1.368	1	15.33
185	14	M5	0	NC	0	-1.368	1	0
186	14	M6	0	NC	0	-26.703	1	7.835
187	14	M10	0	NC	0	-7.673	1	7.835
188	14	M7	0	NC	0	0.241	1	11.439
189	14	M8	0	NC	0	-0.169	1	10.961
190	14	M9	0	NC	0	0.241	1	0
191	14	M11	0	NC	0	-0.169	1	0
192	14	M12	0	NC	0	0.275	1	5.72
193	14	M13	0	NC	0	0.275	1	5.72
194	14	M14	0	NC	0	-0.243	1	5.48
195	14	M15	0	NC	0	-0.243	1	5.48
196	15	M1	0	NC	0	-1.509	1	15.33
197	15	M2	0	NC	0	-1.509	1	0
198	15	M4	0	NC	0	-1.521	1	15.33
199	15	M5	0	NC	0	-1.521	1	0
200	15	M6	0	NC	0	-26.703	1	7.835
201	15	M10	0	NC	0	-7.673	1	7.835
202	15	M7	0	NC	0	0.308	1	11.439
203	15	M8	0	NC	0	-0.335	1	10.961
204	15	M9	0	NC	0	0.308	1	0
205	15	M11	0	NC	0	-0.335	1	0
206	15	M12	0	NC	0	0.275	1	5.72
207	15	M13	0	NC	0	0.275	1	5.72
208	15	M14	0	NC	0	-0.243	1	5.48
209	15	M15	0	NC	0	-0.243	1	5.48
210	16	M1	0	NC	0	-0.987	1	15.33
211	16	M2	0	NC	0	-0.987	1	0
212	16	M4	0	NC	0	-1.006	1	15.33
213	16	M5	0	NC	0	-1.006	1	0
214	16	M6	0	NC	0	-20.028	1	7.835
215	16	M10	0	NC	0	0	NC	15.67
216	16	M7	0	NC	0	0.173	1	11.439
217	16	M8	0	NC	0	0.133	1	4.681
218	16	M9	0	NC	0	0.173	1	0
219	16	M11	0	NC	0	0.133	1	6.28
220	16	M12	0	NC	0	0.206	1	5.72
221	16	M13	0	NC	0	0.206	1	5.72
222	16	M14	0	NC	0	-0.182	1	5.48
223	16	M15	0	NC	0	-0.182	1	5.48
224	17	M1	0	NC	0	-1.154	1	15.33
225	17	M2	0	NC	0	-1.154	1	0
226	17	M4	0	NC	0	-1.158	1	15.33
227	17	M5	0	NC	0	-1.158	1	0
228	17	M6	0	NC	0	-20.028	1	7.835
229	17	M10	0	NC	0	0	NC	15.67
230	17	M7	0	NC	0	0.24	1	11.439
231	17	M8	0	NC	0	-0.272	1	10.961
232	17	M9	0	NC	0	0.24	1	0
233	17	M11	0	NC	0	-0.272	1	0
234	17	M12	0	NC	0	0.206	1	5.72
235	17	M13	0	NC	0	0.206	1	5.72
236	17	M14	0	NC	0	-0.182	1	5.48
237	17	M15	0	NC	0	-0.182	1	5.48

Member 2nd/1st Moment Ratios (Continued)

	LC	Member	y-y Moment [k-ft]	2nd/1st Ratio	Loc [ft]	z-z Moment [k-ft]	2nd/1st Ratio	Loc [ft]
238	18	M1	0	NC	0	-1.189	1	15.33
239	18	M2	0	NC	0	-1.189	1	0
240	18	M4	0	NC	0	-1.202	1	15.33
241	18	M5	0	NC	0	-1.202	1	0
242	18	M6	0	NC	0	-22.253	1	7.835
243	18	M10	0	NC	0	0	NC	15.67
244	18	M7	0	NC	0	0.229	1	11.439
245	18	M8	0	NC	0	-0.21	1	10.961
246	18	M9	0	NC	0	0.229	1	0
247	18	M11	0	NC	0	-0.21	1	0
248	18	M12	0	NC	0	0.229	1	5.72
249	18	M13	0	NC	0	0.229	1	5.72
250	18	M14	0	NC	0	-0.202	1	5.48
251	18	M15	0	NC	0	-0.202	1	5.48
252	19	M1	0	NC	0	0.003	1	15.33
253	19	M2	0	NC	0	0.003	1	0
254	19	M4	0	NC	0	-0.003	1	15.33
255	19	M5	0	NC	0	-0.003	1	0
256	19	M6	0	NC	0	0	NC	15.67
257	19	M10	0	NC	0	-15.347	1	7.835
258	19	M7	0	NC	0	-0.001	1	11.439
259	19	M8	0	NC	0	0.001	1	10.961
260	19	M9	0	NC	0	-0.001	1	0
261	19	M11	0	NC	0	0.001	1	0
262	19	M12	0	NC	0	0	NC	11.439
263	19	M13	0	NC	0	0	NC	11.439
264	19	M14	0	NC	0	0	NC	0
265	19	M15	0	NC	0	0	NC	0
266	20	M1	0	NC	0	0.006	1	15.33
267	20	M2	0	NC	0	0.006	1	0
268	20	M4	0	NC	0	-0.006	1	15.33
269	20	M5	0	NC	0	-0.006	1	0
270	20	M6	0	NC	0	-22.253	1	7.835
271	20	M10	0	NC	0	0	NC	15.67
272	20	M7	0	NC	0	-0.001	1	11.439
273	20	M8	0	NC	0	0.003	1	10.961
274	20	M9	0	NC	0	-0.001	1	0
275	20	M11	0	NC	0	0.003	1	0
276	20	M12	0	NC	0	0	NC	11.439
277	20	M13	0	NC	0	0	NC	11.439
278	20	M14	0	NC	0	0	NC	10.961
279	20	M15	0	NC	0	0	NC	10.961
280	21	M1	0	NC	0	0.083	1.001	15.33
281	21	M2	0	NC	0	0.083	1.001	0
282	21	M4	0	NC	0	0.076	1.001	15.33
283	21	M5	0	NC	0	0.076	1.001	0
284	21	M6	0	NC	0	0	NC	15.67
285	21	M10	0	NC	0	0	NC	15.67
286	21	M7	0	NC	0	-0.034	1	11.439
287	21	M8	0	NC	0	0.083	1	10.961
288	21	M9	0	NC	0	-0.034	1	0
289	21	M11	0	NC	0	0.083	1	0
290	21	M12	0	NC	0	0	NC	11.439
291	21	M13	0	NC	0	0	NC	11.439
292	21	M14	0	NC	0	0	NC	10.961
293	21	M15	0	NC	0	0	NC	10.961

Member Torsion Stresses

	LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
0	1	M1	1	0	0	NC	NC	NC	NC
1			2	0	0	NC	NC	NC	NC
2			3	0	0	NC	NC	NC	NC
3			4	0	0	NC	NC	NC	NC
4			5	0	0	NC	NC	NC	NC
5	1	M2	1	0	0	NC	NC	NC	NC
6			2	0	0	NC	NC	NC	NC
7			3	0	0	NC	NC	NC	NC
8			4	0	0	NC	NC	NC	NC

Member Torsion Stresses (Continued)

	LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
9			5	0	0	NC	NC	NC	NC
10	1	M4	1	0	0	NC	NC	NC	NC
11			2	0	0	NC	NC	NC	NC
12			3	0	0	NC	NC	NC	NC
13			4	0	0	NC	NC	NC	NC
14			5	0	0	NC	NC	NC	NC
15	1	M5	1	0	0	NC	NC	NC	NC
16			2	0	0	NC	NC	NC	NC
17			3	0	0	NC	NC	NC	NC
18			4	0	0	NC	NC	NC	NC
19			5	0	0	NC	NC	NC	NC
20	1	M6	1	0	0	NC	NC	NC	NC
21			2	0	0	NC	NC	NC	NC
22			3	0	0	NC	NC	NC	NC
23			4	0	0	NC	NC	NC	NC
24			5	0	0	NC	NC	NC	NC
25	1	M10	1	0	0	NC	NC	NC	NC
26			2	0	0	NC	NC	NC	NC
27			3	0	0	NC	NC	NC	NC
28			4	0	0	NC	NC	NC	NC
29			5	0	0	NC	NC	NC	NC
30	1	M7	1	0	0	NC	NC	NC	NC
31			2	0	0	NC	NC	NC	NC
32			3	0	0	NC	NC	NC	NC
33			4	0	0	NC	NC	NC	NC
34			5	0	0	NC	NC	NC	NC
35	1	M8	1	0	0	NC	NC	NC	NC
36			2	0	0	NC	NC	NC	NC
37			3	0	0	NC	NC	NC	NC
38			4	0	0	NC	NC	NC	NC
39			5	0	0	NC	NC	NC	NC
40	1	M9	1	0	0	NC	NC	NC	NC
41			2	0	0	NC	NC	NC	NC
42			3	0	0	NC	NC	NC	NC
43			4	0	0	NC	NC	NC	NC
44			5	0	0	NC	NC	NC	NC
45	1	M11	1	0	0	NC	NC	NC	NC
46			2	0	0	NC	NC	NC	NC
47			3	0	0	NC	NC	NC	NC
48			4	0	0	NC	NC	NC	NC
49			5	0	0	NC	NC	NC	NC
50	1	M12	1	0	0	NC	NC	NC	NC
51			2	0	0	NC	NC	NC	NC
52			3	0	0	NC	NC	NC	NC
53			4	0	0	NC	NC	NC	NC
54			5	0	0	NC	NC	NC	NC
55	1	M13	1	0	0	NC	NC	NC	NC
56			2	0	0	NC	NC	NC	NC
57			3	0	0	NC	NC	NC	NC
58			4	0	0	NC	NC	NC	NC
59			5	0	0	NC	NC	NC	NC
60	1	M14	1	0	0	NC	NC	NC	NC
61			2	0	0	NC	NC	NC	NC
62			3	0	0	NC	NC	NC	NC
63			4	0	0	NC	NC	NC	NC
64			5	0	0	NC	NC	NC	NC
65	1	M15	1	0	0	NC	NC	NC	NC
66			2	0	0	NC	NC	NC	NC
67			3	0	0	NC	NC	NC	NC
68			4	0	0	NC	NC	NC	NC
69			5	0	0	NC	NC	NC	NC
70	2	M1	1	0	0	NC	NC	NC	NC
71			2	0	0	NC	NC	NC	NC
72			3	0	0	NC	NC	NC	NC
73			4	0	0	NC	NC	NC	NC
74			5	0	0	NC	NC	NC	NC
75	2	M2	1	0	0	NC	NC	NC	NC
76			2	0	0	NC	NC	NC	NC

Member Torsion Stresses (Continued)

LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
77		3	0	0	NC	NC	NC	NC
78		4	0	0	NC	NC	NC	NC
79		5	0	0	NC	NC	NC	NC
80	2	M4	1	0	0	NC	NC	NC
81		2	0	0	NC	NC	NC	NC
82		3	0	0	NC	NC	NC	NC
83		4	0	0	NC	NC	NC	NC
84		5	0	0	NC	NC	NC	NC
85	2	M5	1	0	0	NC	NC	NC
86		2	0	0	NC	NC	NC	NC
87		3	0	0	NC	NC	NC	NC
88		4	0	0	NC	NC	NC	NC
89		5	0	0	NC	NC	NC	NC
90	2	M6	1	0	0	NC	NC	NC
91		2	0	0	NC	NC	NC	NC
92		3	0	0	NC	NC	NC	NC
93		4	0	0	NC	NC	NC	NC
94		5	0	0	NC	NC	NC	NC
95	2	M10	1	0	0	NC	NC	NC
96		2	0	0	NC	NC	NC	NC
97		3	0	0	NC	NC	NC	NC
98		4	0	0	NC	NC	NC	NC
99		5	0	0	NC	NC	NC	NC
100	2	M7	1	0	0	NC	NC	NC
101		2	0	0	NC	NC	NC	NC
102		3	0	0	NC	NC	NC	NC
103		4	0	0	NC	NC	NC	NC
104		5	0	0	NC	NC	NC	NC
105	2	M8	1	0	0	NC	NC	NC
106		2	0	0	NC	NC	NC	NC
107		3	0	0	NC	NC	NC	NC
108		4	0	0	NC	NC	NC	NC
109		5	0	0	NC	NC	NC	NC
110	2	M9	1	0	0	NC	NC	NC
111		2	0	0	NC	NC	NC	NC
112		3	0	0	NC	NC	NC	NC
113		4	0	0	NC	NC	NC	NC
114		5	0	0	NC	NC	NC	NC
115	2	M11	1	0	0	NC	NC	NC
116		2	0	0	NC	NC	NC	NC
117		3	0	0	NC	NC	NC	NC
118		4	0	0	NC	NC	NC	NC
119		5	0	0	NC	NC	NC	NC
120	2	M12	1	0	0	NC	NC	NC
121		2	0	0	NC	NC	NC	NC
122		3	0	0	NC	NC	NC	NC
123		4	0	0	NC	NC	NC	NC
124		5	0	0	NC	NC	NC	NC
125	2	M13	1	0	0	NC	NC	NC
126		2	0	0	NC	NC	NC	NC
127		3	0	0	NC	NC	NC	NC
128		4	0	0	NC	NC	NC	NC
129		5	0	0	NC	NC	NC	NC
130	2	M14	1	0	0	NC	NC	NC
131		2	0	0	NC	NC	NC	NC
132		3	0	0	NC	NC	NC	NC
133		4	0	0	NC	NC	NC	NC
134		5	0	0	NC	NC	NC	NC
135	2	M15	1	0	0	NC	NC	NC
136		2	0	0	NC	NC	NC	NC
137		3	0	0	NC	NC	NC	NC
138		4	0	0	NC	NC	NC	NC
139		5	0	0	NC	NC	NC	NC
140	3	M1	1	0	0	NC	NC	NC
141		2	0	0	NC	NC	NC	NC
142		3	0	0	NC	NC	NC	NC
143		4	0	0	NC	NC	NC	NC
144		5	0	0	NC	NC	NC	NC

Member Torsion Stresses (Continued)

LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
145	3	M2	1	0	0	NC	NC	NC
146			2	0	0	NC	NC	NC
147			3	0	0	NC	NC	NC
148			4	0	0	NC	NC	NC
149			5	0	0	NC	NC	NC
150	3	M4	1	0	0	NC	NC	NC
151			2	0	0	NC	NC	NC
152			3	0	0	NC	NC	NC
153			4	0	0	NC	NC	NC
154			5	0	0	NC	NC	NC
155	3	M5	1	0	0	NC	NC	NC
156			2	0	0	NC	NC	NC
157			3	0	0	NC	NC	NC
158			4	0	0	NC	NC	NC
159			5	0	0	NC	NC	NC
160	3	M6	1	0	0	NC	NC	NC
161			2	0	0	NC	NC	NC
162			3	0	0	NC	NC	NC
163			4	0	0	NC	NC	NC
164			5	0	0	NC	NC	NC
165	3	M10	1	0	0	NC	NC	NC
166			2	0	0	NC	NC	NC
167			3	0	0	NC	NC	NC
168			4	0	0	NC	NC	NC
169			5	0	0	NC	NC	NC
170	3	M7	1	0	0	NC	NC	NC
171			2	0	0	NC	NC	NC
172			3	0	0	NC	NC	NC
173			4	0	0	NC	NC	NC
174			5	0	0	NC	NC	NC
175	3	M8	1	0	0	NC	NC	NC
176			2	0	0	NC	NC	NC
177			3	0	0	NC	NC	NC
178			4	0	0	NC	NC	NC
179			5	0	0	NC	NC	NC
180	3	M9	1	0	0	NC	NC	NC
181			2	0	0	NC	NC	NC
182			3	0	0	NC	NC	NC
183			4	0	0	NC	NC	NC
184			5	0	0	NC	NC	NC
185	3	M11	1	0	0	NC	NC	NC
186			2	0	0	NC	NC	NC
187			3	0	0	NC	NC	NC
188			4	0	0	NC	NC	NC
189			5	0	0	NC	NC	NC
190	3	M12	1	0	0	NC	NC	NC
191			2	0	0	NC	NC	NC
192			3	0	0	NC	NC	NC
193			4	0	0	NC	NC	NC
194			5	0	0	NC	NC	NC
195	3	M13	1	0	0	NC	NC	NC
196			2	0	0	NC	NC	NC
197			3	0	0	NC	NC	NC
198			4	0	0	NC	NC	NC
199			5	0	0	NC	NC	NC
200	3	M14	1	0	0	NC	NC	NC
201			2	0	0	NC	NC	NC
202			3	0	0	NC	NC	NC
203			4	0	0	NC	NC	NC
204			5	0	0	NC	NC	NC
205	3	M15	1	0	0	NC	NC	NC
206			2	0	0	NC	NC	NC
207			3	0	0	NC	NC	NC
208			4	0	0	NC	NC	NC
209			5	0	0	NC	NC	NC
210	4	M1	1	0	0	NC	NC	NC
211			2	0	0	NC	NC	NC
212			3	0	0	NC	NC	NC

Member Torsion Stresses (Continued)

	LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
213			4	0	0	NC	NC	NC	NC
214			5	0	0	NC	NC	NC	NC
215	4	M2	1	0	0	NC	NC	NC	NC
216			2	0	0	NC	NC	NC	NC
217			3	0	0	NC	NC	NC	NC
218			4	0	0	NC	NC	NC	NC
219			5	0	0	NC	NC	NC	NC
220	4	M4	1	0	0	NC	NC	NC	NC
221			2	0	0	NC	NC	NC	NC
222			3	0	0	NC	NC	NC	NC
223			4	0	0	NC	NC	NC	NC
224			5	0	0	NC	NC	NC	NC
225	4	M5	1	0	0	NC	NC	NC	NC
226			2	0	0	NC	NC	NC	NC
227			3	0	0	NC	NC	NC	NC
228			4	0	0	NC	NC	NC	NC
229			5	0	0	NC	NC	NC	NC
230	4	M6	1	0	0	NC	NC	NC	NC
231			2	0	0	NC	NC	NC	NC
232			3	0	0	NC	NC	NC	NC
233			4	0	0	NC	NC	NC	NC
234			5	0	0	NC	NC	NC	NC
235	4	M10	1	0	0	NC	NC	NC	NC
236			2	0	0	NC	NC	NC	NC
237			3	0	0	NC	NC	NC	NC
238			4	0	0	NC	NC	NC	NC
239			5	0	0	NC	NC	NC	NC
240	4	M7	1	0	0	NC	NC	NC	NC
241			2	0	0	NC	NC	NC	NC
242			3	0	0	NC	NC	NC	NC
243			4	0	0	NC	NC	NC	NC
244			5	0	0	NC	NC	NC	NC
245	4	M8	1	0	0	NC	NC	NC	NC
246			2	0	0	NC	NC	NC	NC
247			3	0	0	NC	NC	NC	NC
248			4	0	0	NC	NC	NC	NC
249			5	0	0	NC	NC	NC	NC
250	4	M9	1	0	0	NC	NC	NC	NC
251			2	0	0	NC	NC	NC	NC
252			3	0	0	NC	NC	NC	NC
253			4	0	0	NC	NC	NC	NC
254			5	0	0	NC	NC	NC	NC
255	4	M11	1	0	0	NC	NC	NC	NC
256			2	0	0	NC	NC	NC	NC
257			3	0	0	NC	NC	NC	NC
258			4	0	0	NC	NC	NC	NC
259			5	0	0	NC	NC	NC	NC
260	4	M12	1	0	0	NC	NC	NC	NC
261			2	0	0	NC	NC	NC	NC
262			3	0	0	NC	NC	NC	NC
263			4	0	0	NC	NC	NC	NC
264			5	0	0	NC	NC	NC	NC
265	4	M13	1	0	0	NC	NC	NC	NC
266			2	0	0	NC	NC	NC	NC
267			3	0	0	NC	NC	NC	NC
268			4	0	0	NC	NC	NC	NC
269			5	0	0	NC	NC	NC	NC
270	4	M14	1	0	0	NC	NC	NC	NC
271			2	0	0	NC	NC	NC	NC
272			3	0	0	NC	NC	NC	NC
273			4	0	0	NC	NC	NC	NC
274			5	0	0	NC	NC	NC	NC
275	4	M15	1	0	0	NC	NC	NC	NC
276			2	0	0	NC	NC	NC	NC
277			3	0	0	NC	NC	NC	NC
278			4	0	0	NC	NC	NC	NC
279			5	0	0	NC	NC	NC	NC
280	5	M1	1	0	0	NC	NC	NC	NC

Member Torsion Stresses (Continued)

LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
281		2	0	0	NC	NC	NC	NC
282		3	0	0	NC	NC	NC	NC
283		4	0	0	NC	NC	NC	NC
284		5	0	0	NC	NC	NC	NC
285	5	M2	1	0	0	NC	NC	NC
286		2	0	0	NC	NC	NC	NC
287		3	0	0	NC	NC	NC	NC
288		4	0	0	NC	NC	NC	NC
289		5	0	0	NC	NC	NC	NC
290	5	M4	1	0	0	NC	NC	NC
291		2	0	0	NC	NC	NC	NC
292		3	0	0	NC	NC	NC	NC
293		4	0	0	NC	NC	NC	NC
294		5	0	0	NC	NC	NC	NC
295	5	M5	1	0	0	NC	NC	NC
296		2	0	0	NC	NC	NC	NC
297		3	0	0	NC	NC	NC	NC
298		4	0	0	NC	NC	NC	NC
299		5	0	0	NC	NC	NC	NC
300	5	M6	1	0	0	NC	NC	NC
301		2	0	0	NC	NC	NC	NC
302		3	0	0	NC	NC	NC	NC
303		4	0	0	NC	NC	NC	NC
304		5	0	0	NC	NC	NC	NC
305	5	M10	1	0	0	NC	NC	NC
306		2	0	0	NC	NC	NC	NC
307		3	0	0	NC	NC	NC	NC
308		4	0	0	NC	NC	NC	NC
309		5	0	0	NC	NC	NC	NC
310	5	M7	1	0	0	NC	NC	NC
311		2	0	0	NC	NC	NC	NC
312		3	0	0	NC	NC	NC	NC
313		4	0	0	NC	NC	NC	NC
314		5	0	0	NC	NC	NC	NC
315	5	M8	1	0	0	NC	NC	NC
316		2	0	0	NC	NC	NC	NC
317		3	0	0	NC	NC	NC	NC
318		4	0	0	NC	NC	NC	NC
319		5	0	0	NC	NC	NC	NC
320	5	M9	1	0	0	NC	NC	NC
321		2	0	0	NC	NC	NC	NC
322		3	0	0	NC	NC	NC	NC
323		4	0	0	NC	NC	NC	NC
324		5	0	0	NC	NC	NC	NC
325	5	M11	1	0	0	NC	NC	NC
326		2	0	0	NC	NC	NC	NC
327		3	0	0	NC	NC	NC	NC
328		4	0	0	NC	NC	NC	NC
329		5	0	0	NC	NC	NC	NC
330	5	M12	1	0	0	NC	NC	NC
331		2	0	0	NC	NC	NC	NC
332		3	0	0	NC	NC	NC	NC
333		4	0	0	NC	NC	NC	NC
334		5	0	0	NC	NC	NC	NC
335	5	M13	1	0	0	NC	NC	NC
336		2	0	0	NC	NC	NC	NC
337		3	0	0	NC	NC	NC	NC
338		4	0	0	NC	NC	NC	NC
339		5	0	0	NC	NC	NC	NC
340	5	M14	1	0	0	NC	NC	NC
341		2	0	0	NC	NC	NC	NC
342		3	0	0	NC	NC	NC	NC
343		4	0	0	NC	NC	NC	NC
344		5	0	0	NC	NC	NC	NC
345	5	M15	1	0	0	NC	NC	NC
346		2	0	0	NC	NC	NC	NC
347		3	0	0	NC	NC	NC	NC
348		4	0	0	NC	NC	NC	NC

Member Torsion Stresses (Continued)

LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
349		5	0	0	NC	NC	NC	NC
350	6	1	0	0	NC	NC	NC	NC
351		2	0	0	NC	NC	NC	NC
352		3	0	0	NC	NC	NC	NC
353		4	0	0	NC	NC	NC	NC
354		5	0	0	NC	NC	NC	NC
355	6	1	0	0	NC	NC	NC	NC
356		2	0	0	NC	NC	NC	NC
357		3	0	0	NC	NC	NC	NC
358		4	0	0	NC	NC	NC	NC
359		5	0	0	NC	NC	NC	NC
360	6	1	0	0	NC	NC	NC	NC
361		2	0	0	NC	NC	NC	NC
362		3	0	0	NC	NC	NC	NC
363		4	0	0	NC	NC	NC	NC
364		5	0	0	NC	NC	NC	NC
365	6	1	0	0	NC	NC	NC	NC
366		2	0	0	NC	NC	NC	NC
367		3	0	0	NC	NC	NC	NC
368		4	0	0	NC	NC	NC	NC
369		5	0	0	NC	NC	NC	NC
370	6	1	0	0	NC	NC	NC	NC
371		2	0	0	NC	NC	NC	NC
372		3	0	0	NC	NC	NC	NC
373		4	0	0	NC	NC	NC	NC
374		5	0	0	NC	NC	NC	NC
375	6	1	0	0	NC	NC	NC	NC
376		2	0	0	NC	NC	NC	NC
377		3	0	0	NC	NC	NC	NC
378		4	0	0	NC	NC	NC	NC
379		5	0	0	NC	NC	NC	NC
380	6	1	0	0	NC	NC	NC	NC
381		2	0	0	NC	NC	NC	NC
382		3	0	0	NC	NC	NC	NC
383		4	0	0	NC	NC	NC	NC
384		5	0	0	NC	NC	NC	NC
385	6	1	0	0	NC	NC	NC	NC
386		2	0	0	NC	NC	NC	NC
387		3	0	0	NC	NC	NC	NC
388		4	0	0	NC	NC	NC	NC
389		5	0	0	NC	NC	NC	NC
390	6	1	0	0	NC	NC	NC	NC
391		2	0	0	NC	NC	NC	NC
392		3	0	0	NC	NC	NC	NC
393		4	0	0	NC	NC	NC	NC
394		5	0	0	NC	NC	NC	NC
395	6	1	0	0	NC	NC	NC	NC
396		2	0	0	NC	NC	NC	NC
397		3	0	0	NC	NC	NC	NC
398		4	0	0	NC	NC	NC	NC
399		5	0	0	NC	NC	NC	NC
400	6	1	0	0	NC	NC	NC	NC
401		2	0	0	NC	NC	NC	NC
402		3	0	0	NC	NC	NC	NC
403		4	0	0	NC	NC	NC	NC
404		5	0	0	NC	NC	NC	NC
405	6	1	0	0	NC	NC	NC	NC
406		2	0	0	NC	NC	NC	NC
407		3	0	0	NC	NC	NC	NC
408		4	0	0	NC	NC	NC	NC
409		5	0	0	NC	NC	NC	NC
410	6	1	0	0	NC	NC	NC	NC
411		2	0	0	NC	NC	NC	NC
412		3	0	0	NC	NC	NC	NC
413		4	0	0	NC	NC	NC	NC
414		5	0	0	NC	NC	NC	NC
415	6	1	0	0	NC	NC	NC	NC
416		2	0	0	NC	NC	NC	NC

Member Torsion Stresses (Continued)

LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
417		3	0	0	NC	NC	NC	NC
418		4	0	0	NC	NC	NC	NC
419		5	0	0	NC	NC	NC	NC
420	7 M1	1	0	0	NC	NC	NC	NC
421		2	0	0	NC	NC	NC	NC
422		3	0	0	NC	NC	NC	NC
423		4	0	0	NC	NC	NC	NC
424		5	0	0	NC	NC	NC	NC
425	7 M2	1	0	0	NC	NC	NC	NC
426		2	0	0	NC	NC	NC	NC
427		3	0	0	NC	NC	NC	NC
428		4	0	0	NC	NC	NC	NC
429		5	0	0	NC	NC	NC	NC
430	7 M4	1	0	0	NC	NC	NC	NC
431		2	0	0	NC	NC	NC	NC
432		3	0	0	NC	NC	NC	NC
433		4	0	0	NC	NC	NC	NC
434		5	0	0	NC	NC	NC	NC
435	7 M5	1	0	0	NC	NC	NC	NC
436		2	0	0	NC	NC	NC	NC
437		3	0	0	NC	NC	NC	NC
438		4	0	0	NC	NC	NC	NC
439		5	0	0	NC	NC	NC	NC
440	7 M6	1	0	0	NC	NC	NC	NC
441		2	0	0	NC	NC	NC	NC
442		3	0	0	NC	NC	NC	NC
443		4	0	0	NC	NC	NC	NC
444		5	0	0	NC	NC	NC	NC
445	7 M10	1	0	0	NC	NC	NC	NC
446		2	0	0	NC	NC	NC	NC
447		3	0	0	NC	NC	NC	NC
448		4	0	0	NC	NC	NC	NC
449		5	0	0	NC	NC	NC	NC
450	7 M7	1	0	0	NC	NC	NC	NC
451		2	0	0	NC	NC	NC	NC
452		3	0	0	NC	NC	NC	NC
453		4	0	0	NC	NC	NC	NC
454		5	0	0	NC	NC	NC	NC
455	7 M8	1	0	0	NC	NC	NC	NC
456		2	0	0	NC	NC	NC	NC
457		3	0	0	NC	NC	NC	NC
458		4	0	0	NC	NC	NC	NC
459		5	0	0	NC	NC	NC	NC
460	7 M9	1	0	0	NC	NC	NC	NC
461		2	0	0	NC	NC	NC	NC
462		3	0	0	NC	NC	NC	NC
463		4	0	0	NC	NC	NC	NC
464		5	0	0	NC	NC	NC	NC
465	7 M11	1	0	0	NC	NC	NC	NC
466		2	0	0	NC	NC	NC	NC
467		3	0	0	NC	NC	NC	NC
468		4	0	0	NC	NC	NC	NC
469		5	0	0	NC	NC	NC	NC
470	7 M12	1	0	0	NC	NC	NC	NC
471		2	0	0	NC	NC	NC	NC
472		3	0	0	NC	NC	NC	NC
473		4	0	0	NC	NC	NC	NC
474		5	0	0	NC	NC	NC	NC
475	7 M13	1	0	0	NC	NC	NC	NC
476		2	0	0	NC	NC	NC	NC
477		3	0	0	NC	NC	NC	NC
478		4	0	0	NC	NC	NC	NC
479		5	0	0	NC	NC	NC	NC
480	7 M14	1	0	0	NC	NC	NC	NC
481		2	0	0	NC	NC	NC	NC
482		3	0	0	NC	NC	NC	NC
483		4	0	0	NC	NC	NC	NC
484		5	0	0	NC	NC	NC	NC

Member Torsion Stresses (Continued)

LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
485	7	M15	1	0	0	NC	NC	NC
486			2	0	0	NC	NC	NC
487			3	0	0	NC	NC	NC
488			4	0	0	NC	NC	NC
489			5	0	0	NC	NC	NC
490	8	M1	1	0	0	NC	NC	NC
491			2	0	0	NC	NC	NC
492			3	0	0	NC	NC	NC
493			4	0	0	NC	NC	NC
494			5	0	0	NC	NC	NC
495	8	M2	1	0	0	NC	NC	NC
496			2	0	0	NC	NC	NC
497			3	0	0	NC	NC	NC
498			4	0	0	NC	NC	NC
499			5	0	0	NC	NC	NC
500	8	M4	1	0	0	NC	NC	NC
501			2	0	0	NC	NC	NC
502			3	0	0	NC	NC	NC
503			4	0	0	NC	NC	NC
504			5	0	0	NC	NC	NC
505	8	M5	1	0	0	NC	NC	NC
506			2	0	0	NC	NC	NC
507			3	0	0	NC	NC	NC
508			4	0	0	NC	NC	NC
509			5	0	0	NC	NC	NC
510	8	M6	1	0	0	NC	NC	NC
511			2	0	0	NC	NC	NC
512			3	0	0	NC	NC	NC
513			4	0	0	NC	NC	NC
514			5	0	0	NC	NC	NC
515	8	M10	1	0	0	NC	NC	NC
516			2	0	0	NC	NC	NC
517			3	0	0	NC	NC	NC
518			4	0	0	NC	NC	NC
519			5	0	0	NC	NC	NC
520	8	M7	1	0	0	NC	NC	NC
521			2	0	0	NC	NC	NC
522			3	0	0	NC	NC	NC
523			4	0	0	NC	NC	NC
524			5	0	0	NC	NC	NC
525	8	M8	1	0	0	NC	NC	NC
526			2	0	0	NC	NC	NC
527			3	0	0	NC	NC	NC
528			4	0	0	NC	NC	NC
529			5	0	0	NC	NC	NC
530	8	M9	1	0	0	NC	NC	NC
531			2	0	0	NC	NC	NC
532			3	0	0	NC	NC	NC
533			4	0	0	NC	NC	NC
534			5	0	0	NC	NC	NC
535	8	M11	1	0	0	NC	NC	NC
536			2	0	0	NC	NC	NC
537			3	0	0	NC	NC	NC
538			4	0	0	NC	NC	NC
539			5	0	0	NC	NC	NC
540	8	M12	1	0	0	NC	NC	NC
541			2	0	0	NC	NC	NC
542			3	0	0	NC	NC	NC
543			4	0	0	NC	NC	NC
544			5	0	0	NC	NC	NC
545	8	M13	1	0	0	NC	NC	NC
546			2	0	0	NC	NC	NC
547			3	0	0	NC	NC	NC
548			4	0	0	NC	NC	NC
549			5	0	0	NC	NC	NC
550	8	M14	1	0	0	NC	NC	NC
551			2	0	0	NC	NC	NC
552			3	0	0	NC	NC	NC

Member Torsion Stresses (Continued)

LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
553		4	0	0	NC	NC	NC	NC
554		5	0	0	NC	NC	NC	NC
555	8	1	0	0	NC	NC	NC	NC
556		2	0	0	NC	NC	NC	NC
557		3	0	0	NC	NC	NC	NC
558		4	0	0	NC	NC	NC	NC
559		5	0	0	NC	NC	NC	NC
560	9	1	0	0	NC	NC	NC	NC
561		2	0	0	NC	NC	NC	NC
562		3	0	0	NC	NC	NC	NC
563		4	0	0	NC	NC	NC	NC
564		5	0	0	NC	NC	NC	NC
565	9	1	0	0	NC	NC	NC	NC
566		2	0	0	NC	NC	NC	NC
567		3	0	0	NC	NC	NC	NC
568		4	0	0	NC	NC	NC	NC
569		5	0	0	NC	NC	NC	NC
570	9	1	0	0	NC	NC	NC	NC
571		2	0	0	NC	NC	NC	NC
572		3	0	0	NC	NC	NC	NC
573		4	0	0	NC	NC	NC	NC
574		5	0	0	NC	NC	NC	NC
575	9	1	0	0	NC	NC	NC	NC
576		2	0	0	NC	NC	NC	NC
577		3	0	0	NC	NC	NC	NC
578		4	0	0	NC	NC	NC	NC
579		5	0	0	NC	NC	NC	NC
580	9	1	0	0	NC	NC	NC	NC
581		2	0	0	NC	NC	NC	NC
582		3	0	0	NC	NC	NC	NC
583		4	0	0	NC	NC	NC	NC
584		5	0	0	NC	NC	NC	NC
585	9	1	0	0	NC	NC	NC	NC
586		2	0	0	NC	NC	NC	NC
587		3	0	0	NC	NC	NC	NC
588		4	0	0	NC	NC	NC	NC
589		5	0	0	NC	NC	NC	NC
590	9	1	0	0	NC	NC	NC	NC
591		2	0	0	NC	NC	NC	NC
592		3	0	0	NC	NC	NC	NC
593		4	0	0	NC	NC	NC	NC
594		5	0	0	NC	NC	NC	NC
595	9	1	0	0	NC	NC	NC	NC
596		2	0	0	NC	NC	NC	NC
597		3	0	0	NC	NC	NC	NC
598		4	0	0	NC	NC	NC	NC
599		5	0	0	NC	NC	NC	NC
600	9	1	0	0	NC	NC	NC	NC
601		2	0	0	NC	NC	NC	NC
602		3	0	0	NC	NC	NC	NC
603		4	0	0	NC	NC	NC	NC
604		5	0	0	NC	NC	NC	NC
605	9	1	0	0	NC	NC	NC	NC
606		2	0	0	NC	NC	NC	NC
607		3	0	0	NC	NC	NC	NC
608		4	0	0	NC	NC	NC	NC
609		5	0	0	NC	NC	NC	NC
610	9	1	0	0	NC	NC	NC	NC
611		2	0	0	NC	NC	NC	NC
612		3	0	0	NC	NC	NC	NC
613		4	0	0	NC	NC	NC	NC
614		5	0	0	NC	NC	NC	NC
615	9	1	0	0	NC	NC	NC	NC
616		2	0	0	NC	NC	NC	NC
617		3	0	0	NC	NC	NC	NC
618		4	0	0	NC	NC	NC	NC
619		5	0	0	NC	NC	NC	NC
620	9	1	0	0	NC	NC	NC	NC

Member Torsion Stresses (Continued)

LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
621		2	0	0	NC	NC	NC	NC
622		3	0	0	NC	NC	NC	NC
623		4	0	0	NC	NC	NC	NC
624		5	0	0	NC	NC	NC	NC
625	9	M15	1	0	0	NC	NC	NC
626		2	0	0	NC	NC	NC	NC
627		3	0	0	NC	NC	NC	NC
628		4	0	0	NC	NC	NC	NC
629		5	0	0	NC	NC	NC	NC
630	10	M1	1	0	0	NC	NC	NC
631		2	0	0	NC	NC	NC	NC
632		3	0	0	NC	NC	NC	NC
633		4	0	0	NC	NC	NC	NC
634		5	0	0	NC	NC	NC	NC
635	10	M2	1	0	0	NC	NC	NC
636		2	0	0	NC	NC	NC	NC
637		3	0	0	NC	NC	NC	NC
638		4	0	0	NC	NC	NC	NC
639		5	0	0	NC	NC	NC	NC
640	10	M4	1	0	0	NC	NC	NC
641		2	0	0	NC	NC	NC	NC
642		3	0	0	NC	NC	NC	NC
643		4	0	0	NC	NC	NC	NC
644		5	0	0	NC	NC	NC	NC
645	10	M5	1	0	0	NC	NC	NC
646		2	0	0	NC	NC	NC	NC
647		3	0	0	NC	NC	NC	NC
648		4	0	0	NC	NC	NC	NC
649		5	0	0	NC	NC	NC	NC
650	10	M6	1	0	0	NC	NC	NC
651		2	0	0	NC	NC	NC	NC
652		3	0	0	NC	NC	NC	NC
653		4	0	0	NC	NC	NC	NC
654		5	0	0	NC	NC	NC	NC
655	10	M10	1	0	0	NC	NC	NC
656		2	0	0	NC	NC	NC	NC
657		3	0	0	NC	NC	NC	NC
658		4	0	0	NC	NC	NC	NC
659		5	0	0	NC	NC	NC	NC
660	10	M7	1	0	0	NC	NC	NC
661		2	0	0	NC	NC	NC	NC
662		3	0	0	NC	NC	NC	NC
663		4	0	0	NC	NC	NC	NC
664		5	0	0	NC	NC	NC	NC
665	10	M8	1	0	0	NC	NC	NC
666		2	0	0	NC	NC	NC	NC
667		3	0	0	NC	NC	NC	NC
668		4	0	0	NC	NC	NC	NC
669		5	0	0	NC	NC	NC	NC
670	10	M9	1	0	0	NC	NC	NC
671		2	0	0	NC	NC	NC	NC
672		3	0	0	NC	NC	NC	NC
673		4	0	0	NC	NC	NC	NC
674		5	0	0	NC	NC	NC	NC
675	10	M11	1	0	0	NC	NC	NC
676		2	0	0	NC	NC	NC	NC
677		3	0	0	NC	NC	NC	NC
678		4	0	0	NC	NC	NC	NC
679		5	0	0	NC	NC	NC	NC
680	10	M12	1	0	0	NC	NC	NC
681		2	0	0	NC	NC	NC	NC
682		3	0	0	NC	NC	NC	NC
683		4	0	0	NC	NC	NC	NC
684		5	0	0	NC	NC	NC	NC
685	10	M13	1	0	0	NC	NC	NC
686		2	0	0	NC	NC	NC	NC
687		3	0	0	NC	NC	NC	NC
688		4	0	0	NC	NC	NC	NC

Member Torsion Stresses (Continued)

	LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
689			5	0	0	NC	NC	NC	NC
690	10	M14	1	0	0	NC	NC	NC	NC
691			2	0	0	NC	NC	NC	NC
692			3	0	0	NC	NC	NC	NC
693			4	0	0	NC	NC	NC	NC
694			5	0	0	NC	NC	NC	NC
695	10	M15	1	0	0	NC	NC	NC	NC
696			2	0	0	NC	NC	NC	NC
697			3	0	0	NC	NC	NC	NC
698			4	0	0	NC	NC	NC	NC
699			5	0	0	NC	NC	NC	NC
700	11	M1	1	0	0	NC	NC	NC	NC
701			2	0	0	NC	NC	NC	NC
702			3	0	0	NC	NC	NC	NC
703			4	0	0	NC	NC	NC	NC
704			5	0	0	NC	NC	NC	NC
705	11	M2	1	0	0	NC	NC	NC	NC
706			2	0	0	NC	NC	NC	NC
707			3	0	0	NC	NC	NC	NC
708			4	0	0	NC	NC	NC	NC
709			5	0	0	NC	NC	NC	NC
710	11	M4	1	0	0	NC	NC	NC	NC
711			2	0	0	NC	NC	NC	NC
712			3	0	0	NC	NC	NC	NC
713			4	0	0	NC	NC	NC	NC
714			5	0	0	NC	NC	NC	NC
715	11	M5	1	0	0	NC	NC	NC	NC
716			2	0	0	NC	NC	NC	NC
717			3	0	0	NC	NC	NC	NC
718			4	0	0	NC	NC	NC	NC
719			5	0	0	NC	NC	NC	NC
720	11	M6	1	0	0	NC	NC	NC	NC
721			2	0	0	NC	NC	NC	NC
722			3	0	0	NC	NC	NC	NC
723			4	0	0	NC	NC	NC	NC
724			5	0	0	NC	NC	NC	NC
725	11	M10	1	0	0	NC	NC	NC	NC
726			2	0	0	NC	NC	NC	NC
727			3	0	0	NC	NC	NC	NC
728			4	0	0	NC	NC	NC	NC
729			5	0	0	NC	NC	NC	NC
730	11	M7	1	0	0	NC	NC	NC	NC
731			2	0	0	NC	NC	NC	NC
732			3	0	0	NC	NC	NC	NC
733			4	0	0	NC	NC	NC	NC
734			5	0	0	NC	NC	NC	NC
735	11	M8	1	0	0	NC	NC	NC	NC
736			2	0	0	NC	NC	NC	NC
737			3	0	0	NC	NC	NC	NC
738			4	0	0	NC	NC	NC	NC
739			5	0	0	NC	NC	NC	NC
740	11	M9	1	0	0	NC	NC	NC	NC
741			2	0	0	NC	NC	NC	NC
742			3	0	0	NC	NC	NC	NC
743			4	0	0	NC	NC	NC	NC
744			5	0	0	NC	NC	NC	NC
745	11	M11	1	0	0	NC	NC	NC	NC
746			2	0	0	NC	NC	NC	NC
747			3	0	0	NC	NC	NC	NC
748			4	0	0	NC	NC	NC	NC
749			5	0	0	NC	NC	NC	NC
750	11	M12	1	0	0	NC	NC	NC	NC
751			2	0	0	NC	NC	NC	NC
752			3	0	0	NC	NC	NC	NC
753			4	0	0	NC	NC	NC	NC
754			5	0	0	NC	NC	NC	NC
755	11	M13	1	0	0	NC	NC	NC	NC
756			2	0	0	NC	NC	NC	NC

Member Torsion Stresses (Continued)

LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
757		3	0	0	NC	NC	NC	NC
758		4	0	0	NC	NC	NC	NC
759		5	0	0	NC	NC	NC	NC
760	11	M14	1	0	0	NC	NC	NC
761		2	0	0	NC	NC	NC	NC
762		3	0	0	NC	NC	NC	NC
763		4	0	0	NC	NC	NC	NC
764		5	0	0	NC	NC	NC	NC
765	11	M15	1	0	0	NC	NC	NC
766		2	0	0	NC	NC	NC	NC
767		3	0	0	NC	NC	NC	NC
768		4	0	0	NC	NC	NC	NC
769		5	0	0	NC	NC	NC	NC
770	12	M1	1	0	0	NC	NC	NC
771		2	0	0	NC	NC	NC	NC
772		3	0	0	NC	NC	NC	NC
773		4	0	0	NC	NC	NC	NC
774		5	0	0	NC	NC	NC	NC
775	12	M2	1	0	0	NC	NC	NC
776		2	0	0	NC	NC	NC	NC
777		3	0	0	NC	NC	NC	NC
778		4	0	0	NC	NC	NC	NC
779		5	0	0	NC	NC	NC	NC
780	12	M4	1	0	0	NC	NC	NC
781		2	0	0	NC	NC	NC	NC
782		3	0	0	NC	NC	NC	NC
783		4	0	0	NC	NC	NC	NC
784		5	0	0	NC	NC	NC	NC
785	12	M5	1	0	0	NC	NC	NC
786		2	0	0	NC	NC	NC	NC
787		3	0	0	NC	NC	NC	NC
788		4	0	0	NC	NC	NC	NC
789		5	0	0	NC	NC	NC	NC
790	12	M6	1	0	0	NC	NC	NC
791		2	0	0	NC	NC	NC	NC
792		3	0	0	NC	NC	NC	NC
793		4	0	0	NC	NC	NC	NC
794		5	0	0	NC	NC	NC	NC
795	12	M10	1	0	0	NC	NC	NC
796		2	0	0	NC	NC	NC	NC
797		3	0	0	NC	NC	NC	NC
798		4	0	0	NC	NC	NC	NC
799		5	0	0	NC	NC	NC	NC
800	12	M7	1	0	0	NC	NC	NC
801		2	0	0	NC	NC	NC	NC
802		3	0	0	NC	NC	NC	NC
803		4	0	0	NC	NC	NC	NC
804		5	0	0	NC	NC	NC	NC
805	12	M8	1	0	0	NC	NC	NC
806		2	0	0	NC	NC	NC	NC
807		3	0	0	NC	NC	NC	NC
808		4	0	0	NC	NC	NC	NC
809		5	0	0	NC	NC	NC	NC
810	12	M9	1	0	0	NC	NC	NC
811		2	0	0	NC	NC	NC	NC
812		3	0	0	NC	NC	NC	NC
813		4	0	0	NC	NC	NC	NC
814		5	0	0	NC	NC	NC	NC
815	12	M11	1	0	0	NC	NC	NC
816		2	0	0	NC	NC	NC	NC
817		3	0	0	NC	NC	NC	NC
818		4	0	0	NC	NC	NC	NC
819		5	0	0	NC	NC	NC	NC
820	12	M12	1	0	0	NC	NC	NC
821		2	0	0	NC	NC	NC	NC
822		3	0	0	NC	NC	NC	NC
823		4	0	0	NC	NC	NC	NC
824		5	0	0	NC	NC	NC	NC

Member Torsion Stresses (Continued)

	LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
825	12	M13	1	0	0	NC	NC	NC	NC
826			2	0	0	NC	NC	NC	NC
827			3	0	0	NC	NC	NC	NC
828			4	0	0	NC	NC	NC	NC
829			5	0	0	NC	NC	NC	NC
830	12	M14	1	0	0	NC	NC	NC	NC
831			2	0	0	NC	NC	NC	NC
832			3	0	0	NC	NC	NC	NC
833			4	0	0	NC	NC	NC	NC
834			5	0	0	NC	NC	NC	NC
835	12	M15	1	0	0	NC	NC	NC	NC
836			2	0	0	NC	NC	NC	NC
837			3	0	0	NC	NC	NC	NC
838			4	0	0	NC	NC	NC	NC
839			5	0	0	NC	NC	NC	NC
840	13	M1	1	0	0	NC	NC	NC	NC
841			2	0	0	NC	NC	NC	NC
842			3	0	0	NC	NC	NC	NC
843			4	0	0	NC	NC	NC	NC
844			5	0	0	NC	NC	NC	NC
845	13	M2	1	0	0	NC	NC	NC	NC
846			2	0	0	NC	NC	NC	NC
847			3	0	0	NC	NC	NC	NC
848			4	0	0	NC	NC	NC	NC
849			5	0	0	NC	NC	NC	NC
850	13	M4	1	0	0	NC	NC	NC	NC
851			2	0	0	NC	NC	NC	NC
852			3	0	0	NC	NC	NC	NC
853			4	0	0	NC	NC	NC	NC
854			5	0	0	NC	NC	NC	NC
855	13	M5	1	0	0	NC	NC	NC	NC
856			2	0	0	NC	NC	NC	NC
857			3	0	0	NC	NC	NC	NC
858			4	0	0	NC	NC	NC	NC
859			5	0	0	NC	NC	NC	NC
860	13	M6	1	0	0	NC	NC	NC	NC
861			2	0	0	NC	NC	NC	NC
862			3	0	0	NC	NC	NC	NC
863			4	0	0	NC	NC	NC	NC
864			5	0	0	NC	NC	NC	NC
865	13	M10	1	0	0	NC	NC	NC	NC
866			2	0	0	NC	NC	NC	NC
867			3	0	0	NC	NC	NC	NC
868			4	0	0	NC	NC	NC	NC
869			5	0	0	NC	NC	NC	NC
870	13	M7	1	0	0	NC	NC	NC	NC
871			2	0	0	NC	NC	NC	NC
872			3	0	0	NC	NC	NC	NC
873			4	0	0	NC	NC	NC	NC
874			5	0	0	NC	NC	NC	NC
875	13	M8	1	0	0	NC	NC	NC	NC
876			2	0	0	NC	NC	NC	NC
877			3	0	0	NC	NC	NC	NC
878			4	0	0	NC	NC	NC	NC
879			5	0	0	NC	NC	NC	NC
880	13	M9	1	0	0	NC	NC	NC	NC
881			2	0	0	NC	NC	NC	NC
882			3	0	0	NC	NC	NC	NC
883			4	0	0	NC	NC	NC	NC
884			5	0	0	NC	NC	NC	NC
885	13	M11	1	0	0	NC	NC	NC	NC
886			2	0	0	NC	NC	NC	NC
887			3	0	0	NC	NC	NC	NC
888			4	0	0	NC	NC	NC	NC
889			5	0	0	NC	NC	NC	NC
890	13	M12	1	0	0	NC	NC	NC	NC
891			2	0	0	NC	NC	NC	NC
892			3	0	0	NC	NC	NC	NC

Member Torsion Stresses (Continued)

LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
893		4	0	0	NC	NC	NC	NC
894		5	0	0	NC	NC	NC	NC
895	13	M13	1	0	0	NC	NC	NC
896		2	0	0	NC	NC	NC	NC
897		3	0	0	NC	NC	NC	NC
898		4	0	0	NC	NC	NC	NC
899		5	0	0	NC	NC	NC	NC
900	13	M14	1	0	0	NC	NC	NC
901		2	0	0	NC	NC	NC	NC
902		3	0	0	NC	NC	NC	NC
903		4	0	0	NC	NC	NC	NC
904		5	0	0	NC	NC	NC	NC
905	13	M15	1	0	0	NC	NC	NC
906		2	0	0	NC	NC	NC	NC
907		3	0	0	NC	NC	NC	NC
908		4	0	0	NC	NC	NC	NC
909		5	0	0	NC	NC	NC	NC
910	14	M1	1	0	0	NC	NC	NC
911		2	0	0	NC	NC	NC	NC
912		3	0	0	NC	NC	NC	NC
913		4	0	0	NC	NC	NC	NC
914		5	0	0	NC	NC	NC	NC
915	14	M2	1	0	0	NC	NC	NC
916		2	0	0	NC	NC	NC	NC
917		3	0	0	NC	NC	NC	NC
918		4	0	0	NC	NC	NC	NC
919		5	0	0	NC	NC	NC	NC
920	14	M4	1	0	0	NC	NC	NC
921		2	0	0	NC	NC	NC	NC
922		3	0	0	NC	NC	NC	NC
923		4	0	0	NC	NC	NC	NC
924		5	0	0	NC	NC	NC	NC
925	14	M5	1	0	0	NC	NC	NC
926		2	0	0	NC	NC	NC	NC
927		3	0	0	NC	NC	NC	NC
928		4	0	0	NC	NC	NC	NC
929		5	0	0	NC	NC	NC	NC
930	14	M6	1	0	0	NC	NC	NC
931		2	0	0	NC	NC	NC	NC
932		3	0	0	NC	NC	NC	NC
933		4	0	0	NC	NC	NC	NC
934		5	0	0	NC	NC	NC	NC
935	14	M10	1	0	0	NC	NC	NC
936		2	0	0	NC	NC	NC	NC
937		3	0	0	NC	NC	NC	NC
938		4	0	0	NC	NC	NC	NC
939		5	0	0	NC	NC	NC	NC
940	14	M7	1	0	0	NC	NC	NC
941		2	0	0	NC	NC	NC	NC
942		3	0	0	NC	NC	NC	NC
943		4	0	0	NC	NC	NC	NC
944		5	0	0	NC	NC	NC	NC
945	14	M8	1	0	0	NC	NC	NC
946		2	0	0	NC	NC	NC	NC
947		3	0	0	NC	NC	NC	NC
948		4	0	0	NC	NC	NC	NC
949		5	0	0	NC	NC	NC	NC
950	14	M9	1	0	0	NC	NC	NC
951		2	0	0	NC	NC	NC	NC
952		3	0	0	NC	NC	NC	NC
953		4	0	0	NC	NC	NC	NC
954		5	0	0	NC	NC	NC	NC
955	14	M11	1	0	0	NC	NC	NC
956		2	0	0	NC	NC	NC	NC
957		3	0	0	NC	NC	NC	NC
958		4	0	0	NC	NC	NC	NC
959		5	0	0	NC	NC	NC	NC
960	14	M12	1	0	0	NC	NC	NC

Member Torsion Stresses (Continued)

LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
961		2	0	0	NC	NC	NC	NC
962		3	0	0	NC	NC	NC	NC
963		4	0	0	NC	NC	NC	NC
964		5	0	0	NC	NC	NC	NC
965	14	M13	1	0	0	NC	NC	NC
966		2	0	0	NC	NC	NC	NC
967		3	0	0	NC	NC	NC	NC
968		4	0	0	NC	NC	NC	NC
969		5	0	0	NC	NC	NC	NC
970	14	M14	1	0	0	NC	NC	NC
971		2	0	0	NC	NC	NC	NC
972		3	0	0	NC	NC	NC	NC
973		4	0	0	NC	NC	NC	NC
974		5	0	0	NC	NC	NC	NC
975	14	M15	1	0	0	NC	NC	NC
976		2	0	0	NC	NC	NC	NC
977		3	0	0	NC	NC	NC	NC
978		4	0	0	NC	NC	NC	NC
979		5	0	0	NC	NC	NC	NC
980	15	M1	1	0	0	NC	NC	NC
981		2	0	0	NC	NC	NC	NC
982		3	0	0	NC	NC	NC	NC
983		4	0	0	NC	NC	NC	NC
984		5	0	0	NC	NC	NC	NC
985	15	M2	1	0	0	NC	NC	NC
986		2	0	0	NC	NC	NC	NC
987		3	0	0	NC	NC	NC	NC
988		4	0	0	NC	NC	NC	NC
989		5	0	0	NC	NC	NC	NC
990	15	M4	1	0	0	NC	NC	NC
991		2	0	0	NC	NC	NC	NC
992		3	0	0	NC	NC	NC	NC
993		4	0	0	NC	NC	NC	NC
994		5	0	0	NC	NC	NC	NC
995	15	M5	1	0	0	NC	NC	NC
996		2	0	0	NC	NC	NC	NC
997		3	0	0	NC	NC	NC	NC
998		4	0	0	NC	NC	NC	NC
999		5	0	0	NC	NC	NC	NC
1000	15	M6	1	0	0	NC	NC	NC
1001		2	0	0	NC	NC	NC	NC
1002		3	0	0	NC	NC	NC	NC
1003		4	0	0	NC	NC	NC	NC
1004		5	0	0	NC	NC	NC	NC
1005	15	M10	1	0	0	NC	NC	NC
1006		2	0	0	NC	NC	NC	NC
1007		3	0	0	NC	NC	NC	NC
1008		4	0	0	NC	NC	NC	NC
1009		5	0	0	NC	NC	NC	NC
1010	15	M7	1	0	0	NC	NC	NC
1011		2	0	0	NC	NC	NC	NC
1012		3	0	0	NC	NC	NC	NC
1013		4	0	0	NC	NC	NC	NC
1014		5	0	0	NC	NC	NC	NC
1015	15	M8	1	0	0	NC	NC	NC
1016		2	0	0	NC	NC	NC	NC
1017		3	0	0	NC	NC	NC	NC
1018		4	0	0	NC	NC	NC	NC
1019		5	0	0	NC	NC	NC	NC
1020	15	M9	1	0	0	NC	NC	NC
1021		2	0	0	NC	NC	NC	NC
1022		3	0	0	NC	NC	NC	NC
1023		4	0	0	NC	NC	NC	NC
1024		5	0	0	NC	NC	NC	NC
1025	15	M11	1	0	0	NC	NC	NC
1026		2	0	0	NC	NC	NC	NC
1027		3	0	0	NC	NC	NC	NC
1028		4	0	0	NC	NC	NC	NC

Member Torsion Stresses (Continued)

LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
1029		5	0	0	NC	NC	NC	NC
1030	15	M12	1	0	0	NC	NC	NC
1031		2	0	0	NC	NC	NC	NC
1032		3	0	0	NC	NC	NC	NC
1033		4	0	0	NC	NC	NC	NC
1034		5	0	0	NC	NC	NC	NC
1035	15	M13	1	0	0	NC	NC	NC
1036		2	0	0	NC	NC	NC	NC
1037		3	0	0	NC	NC	NC	NC
1038		4	0	0	NC	NC	NC	NC
1039		5	0	0	NC	NC	NC	NC
1040	15	M14	1	0	0	NC	NC	NC
1041		2	0	0	NC	NC	NC	NC
1042		3	0	0	NC	NC	NC	NC
1043		4	0	0	NC	NC	NC	NC
1044		5	0	0	NC	NC	NC	NC
1045	15	M15	1	0	0	NC	NC	NC
1046		2	0	0	NC	NC	NC	NC
1047		3	0	0	NC	NC	NC	NC
1048		4	0	0	NC	NC	NC	NC
1049		5	0	0	NC	NC	NC	NC
1050	16	M1	1	0	0	NC	NC	NC
1051		2	0	0	NC	NC	NC	NC
1052		3	0	0	NC	NC	NC	NC
1053		4	0	0	NC	NC	NC	NC
1054		5	0	0	NC	NC	NC	NC
1055	16	M2	1	0	0	NC	NC	NC
1056		2	0	0	NC	NC	NC	NC
1057		3	0	0	NC	NC	NC	NC
1058		4	0	0	NC	NC	NC	NC
1059		5	0	0	NC	NC	NC	NC
1060	16	M4	1	0	0	NC	NC	NC
1061		2	0	0	NC	NC	NC	NC
1062		3	0	0	NC	NC	NC	NC
1063		4	0	0	NC	NC	NC	NC
1064		5	0	0	NC	NC	NC	NC
1065	16	M5	1	0	0	NC	NC	NC
1066		2	0	0	NC	NC	NC	NC
1067		3	0	0	NC	NC	NC	NC
1068		4	0	0	NC	NC	NC	NC
1069		5	0	0	NC	NC	NC	NC
1070	16	M6	1	0	0	NC	NC	NC
1071		2	0	0	NC	NC	NC	NC
1072		3	0	0	NC	NC	NC	NC
1073		4	0	0	NC	NC	NC	NC
1074		5	0	0	NC	NC	NC	NC
1075	16	M10	1	0	0	NC	NC	NC
1076		2	0	0	NC	NC	NC	NC
1077		3	0	0	NC	NC	NC	NC
1078		4	0	0	NC	NC	NC	NC
1079		5	0	0	NC	NC	NC	NC
1080	16	M7	1	0	0	NC	NC	NC
1081		2	0	0	NC	NC	NC	NC
1082		3	0	0	NC	NC	NC	NC
1083		4	0	0	NC	NC	NC	NC
1084		5	0	0	NC	NC	NC	NC
1085	16	M8	1	0	0	NC	NC	NC
1086		2	0	0	NC	NC	NC	NC
1087		3	0	0	NC	NC	NC	NC
1088		4	0	0	NC	NC	NC	NC
1089		5	0	0	NC	NC	NC	NC
1090	16	M9	1	0	0	NC	NC	NC
1091		2	0	0	NC	NC	NC	NC
1092		3	0	0	NC	NC	NC	NC
1093		4	0	0	NC	NC	NC	NC
1094		5	0	0	NC	NC	NC	NC
1095	16	M11	1	0	0	NC	NC	NC
1096		2	0	0	NC	NC	NC	NC

Member Torsion Stresses (Continued)

LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
1097		3	0	0	NC	NC	NC	NC
1098		4	0	0	NC	NC	NC	NC
1099		5	0	0	NC	NC	NC	NC
1100	16	M12	1	0	0	NC	NC	NC
1101		2	0	0	NC	NC	NC	NC
1102		3	0	0	NC	NC	NC	NC
1103		4	0	0	NC	NC	NC	NC
1104		5	0	0	NC	NC	NC	NC
1105	16	M13	1	0	0	NC	NC	NC
1106		2	0	0	NC	NC	NC	NC
1107		3	0	0	NC	NC	NC	NC
1108		4	0	0	NC	NC	NC	NC
1109		5	0	0	NC	NC	NC	NC
1110	16	M14	1	0	0	NC	NC	NC
1111		2	0	0	NC	NC	NC	NC
1112		3	0	0	NC	NC	NC	NC
1113		4	0	0	NC	NC	NC	NC
1114		5	0	0	NC	NC	NC	NC
1115	16	M15	1	0	0	NC	NC	NC
1116		2	0	0	NC	NC	NC	NC
1117		3	0	0	NC	NC	NC	NC
1118		4	0	0	NC	NC	NC	NC
1119		5	0	0	NC	NC	NC	NC
1120	17	M1	1	0	0	NC	NC	NC
1121		2	0	0	NC	NC	NC	NC
1122		3	0	0	NC	NC	NC	NC
1123		4	0	0	NC	NC	NC	NC
1124		5	0	0	NC	NC	NC	NC
1125	17	M2	1	0	0	NC	NC	NC
1126		2	0	0	NC	NC	NC	NC
1127		3	0	0	NC	NC	NC	NC
1128		4	0	0	NC	NC	NC	NC
1129		5	0	0	NC	NC	NC	NC
1130	17	M4	1	0	0	NC	NC	NC
1131		2	0	0	NC	NC	NC	NC
1132		3	0	0	NC	NC	NC	NC
1133		4	0	0	NC	NC	NC	NC
1134		5	0	0	NC	NC	NC	NC
1135	17	M5	1	0	0	NC	NC	NC
1136		2	0	0	NC	NC	NC	NC
1137		3	0	0	NC	NC	NC	NC
1138		4	0	0	NC	NC	NC	NC
1139		5	0	0	NC	NC	NC	NC
1140	17	M6	1	0	0	NC	NC	NC
1141		2	0	0	NC	NC	NC	NC
1142		3	0	0	NC	NC	NC	NC
1143		4	0	0	NC	NC	NC	NC
1144		5	0	0	NC	NC	NC	NC
1145	17	M10	1	0	0	NC	NC	NC
1146		2	0	0	NC	NC	NC	NC
1147		3	0	0	NC	NC	NC	NC
1148		4	0	0	NC	NC	NC	NC
1149		5	0	0	NC	NC	NC	NC
1150	17	M7	1	0	0	NC	NC	NC
1151		2	0	0	NC	NC	NC	NC
1152		3	0	0	NC	NC	NC	NC
1153		4	0	0	NC	NC	NC	NC
1154		5	0	0	NC	NC	NC	NC
1155	17	M8	1	0	0	NC	NC	NC
1156		2	0	0	NC	NC	NC	NC
1157		3	0	0	NC	NC	NC	NC
1158		4	0	0	NC	NC	NC	NC
1159		5	0	0	NC	NC	NC	NC
1160	17	M9	1	0	0	NC	NC	NC
1161		2	0	0	NC	NC	NC	NC
1162		3	0	0	NC	NC	NC	NC
1163		4	0	0	NC	NC	NC	NC
1164		5	0	0	NC	NC	NC	NC

Member Torsion Stresses (Continued)

LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
1165	17	M11	1	0	0	NC	NC	NC
1166			2	0	0	NC	NC	NC
1167			3	0	0	NC	NC	NC
1168			4	0	0	NC	NC	NC
1169			5	0	0	NC	NC	NC
1170	17	M12	1	0	0	NC	NC	NC
1171			2	0	0	NC	NC	NC
1172			3	0	0	NC	NC	NC
1173			4	0	0	NC	NC	NC
1174			5	0	0	NC	NC	NC
1175	17	M13	1	0	0	NC	NC	NC
1176			2	0	0	NC	NC	NC
1177			3	0	0	NC	NC	NC
1178			4	0	0	NC	NC	NC
1179			5	0	0	NC	NC	NC
1180	17	M14	1	0	0	NC	NC	NC
1181			2	0	0	NC	NC	NC
1182			3	0	0	NC	NC	NC
1183			4	0	0	NC	NC	NC
1184			5	0	0	NC	NC	NC
1185	17	M15	1	0	0	NC	NC	NC
1186			2	0	0	NC	NC	NC
1187			3	0	0	NC	NC	NC
1188			4	0	0	NC	NC	NC
1189			5	0	0	NC	NC	NC
1190	18	M1	1	0	0	NC	NC	NC
1191			2	0	0	NC	NC	NC
1192			3	0	0	NC	NC	NC
1193			4	0	0	NC	NC	NC
1194			5	0	0	NC	NC	NC
1195	18	M2	1	0	0	NC	NC	NC
1196			2	0	0	NC	NC	NC
1197			3	0	0	NC	NC	NC
1198			4	0	0	NC	NC	NC
1199			5	0	0	NC	NC	NC
1200	18	M4	1	0	0	NC	NC	NC
1201			2	0	0	NC	NC	NC
1202			3	0	0	NC	NC	NC
1203			4	0	0	NC	NC	NC
1204			5	0	0	NC	NC	NC
1205	18	M5	1	0	0	NC	NC	NC
1206			2	0	0	NC	NC	NC
1207			3	0	0	NC	NC	NC
1208			4	0	0	NC	NC	NC
1209			5	0	0	NC	NC	NC
1210	18	M6	1	0	0	NC	NC	NC
1211			2	0	0	NC	NC	NC
1212			3	0	0	NC	NC	NC
1213			4	0	0	NC	NC	NC
1214			5	0	0	NC	NC	NC
1215	18	M10	1	0	0	NC	NC	NC
1216			2	0	0	NC	NC	NC
1217			3	0	0	NC	NC	NC
1218			4	0	0	NC	NC	NC
1219			5	0	0	NC	NC	NC
1220	18	M7	1	0	0	NC	NC	NC
1221			2	0	0	NC	NC	NC
1222			3	0	0	NC	NC	NC
1223			4	0	0	NC	NC	NC
1224			5	0	0	NC	NC	NC
1225	18	M8	1	0	0	NC	NC	NC
1226			2	0	0	NC	NC	NC
1227			3	0	0	NC	NC	NC
1228			4	0	0	NC	NC	NC
1229			5	0	0	NC	NC	NC
1230	18	M9	1	0	0	NC	NC	NC
1231			2	0	0	NC	NC	NC
1232			3	0	0	NC	NC	NC

Member Torsion Stresses (Continued)

LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
1233		4	0	0	NC	NC	NC	NC
1234		5	0	0	NC	NC	NC	NC
1235	18	M11	1	0	0	NC	NC	NC
1236		2	0	0	NC	NC	NC	NC
1237		3	0	0	NC	NC	NC	NC
1238		4	0	0	NC	NC	NC	NC
1239		5	0	0	NC	NC	NC	NC
1240	18	M12	1	0	0	NC	NC	NC
1241		2	0	0	NC	NC	NC	NC
1242		3	0	0	NC	NC	NC	NC
1243		4	0	0	NC	NC	NC	NC
1244		5	0	0	NC	NC	NC	NC
1245	18	M13	1	0	0	NC	NC	NC
1246		2	0	0	NC	NC	NC	NC
1247		3	0	0	NC	NC	NC	NC
1248		4	0	0	NC	NC	NC	NC
1249		5	0	0	NC	NC	NC	NC
1250	18	M14	1	0	0	NC	NC	NC
1251		2	0	0	NC	NC	NC	NC
1252		3	0	0	NC	NC	NC	NC
1253		4	0	0	NC	NC	NC	NC
1254		5	0	0	NC	NC	NC	NC
1255	18	M15	1	0	0	NC	NC	NC
1256		2	0	0	NC	NC	NC	NC
1257		3	0	0	NC	NC	NC	NC
1258		4	0	0	NC	NC	NC	NC
1259		5	0	0	NC	NC	NC	NC
1260	19	M1	1	0	0	NC	NC	NC
1261		2	0	0	NC	NC	NC	NC
1262		3	0	0	NC	NC	NC	NC
1263		4	0	0	NC	NC	NC	NC
1264		5	0	0	NC	NC	NC	NC
1265	19	M2	1	0	0	NC	NC	NC
1266		2	0	0	NC	NC	NC	NC
1267		3	0	0	NC	NC	NC	NC
1268		4	0	0	NC	NC	NC	NC
1269		5	0	0	NC	NC	NC	NC
1270	19	M4	1	0	0	NC	NC	NC
1271		2	0	0	NC	NC	NC	NC
1272		3	0	0	NC	NC	NC	NC
1273		4	0	0	NC	NC	NC	NC
1274		5	0	0	NC	NC	NC	NC
1275	19	M5	1	0	0	NC	NC	NC
1276		2	0	0	NC	NC	NC	NC
1277		3	0	0	NC	NC	NC	NC
1278		4	0	0	NC	NC	NC	NC
1279		5	0	0	NC	NC	NC	NC
1280	19	M6	1	0	0	NC	NC	NC
1281		2	0	0	NC	NC	NC	NC
1282		3	0	0	NC	NC	NC	NC
1283		4	0	0	NC	NC	NC	NC
1284		5	0	0	NC	NC	NC	NC
1285	19	M10	1	0	0	NC	NC	NC
1286		2	0	0	NC	NC	NC	NC
1287		3	0	0	NC	NC	NC	NC
1288		4	0	0	NC	NC	NC	NC
1289		5	0	0	NC	NC	NC	NC
1290	19	M7	1	0	0	NC	NC	NC
1291		2	0	0	NC	NC	NC	NC
1292		3	0	0	NC	NC	NC	NC
1293		4	0	0	NC	NC	NC	NC
1294		5	0	0	NC	NC	NC	NC
1295	19	M8	1	0	0	NC	NC	NC
1296		2	0	0	NC	NC	NC	NC
1297		3	0	0	NC	NC	NC	NC
1298		4	0	0	NC	NC	NC	NC
1299		5	0	0	NC	NC	NC	NC
1300	19	M9	1	0	0	NC	NC	NC

Member Torsion Stresses (Continued)

LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
1301		2	0	0	NC	NC	NC	NC
1302		3	0	0	NC	NC	NC	NC
1303		4	0	0	NC	NC	NC	NC
1304		5	0	0	NC	NC	NC	NC
1305	19	M11	1	0	0	NC	NC	NC
1306		2	0	0	NC	NC	NC	NC
1307		3	0	0	NC	NC	NC	NC
1308		4	0	0	NC	NC	NC	NC
1309		5	0	0	NC	NC	NC	NC
1310	19	M12	1	0	0	NC	NC	NC
1311		2	0	0	NC	NC	NC	NC
1312		3	0	0	NC	NC	NC	NC
1313		4	0	0	NC	NC	NC	NC
1314		5	0	0	NC	NC	NC	NC
1315	19	M13	1	0	0	NC	NC	NC
1316		2	0	0	NC	NC	NC	NC
1317		3	0	0	NC	NC	NC	NC
1318		4	0	0	NC	NC	NC	NC
1319		5	0	0	NC	NC	NC	NC
1320	19	M14	1	0	0	NC	NC	NC
1321		2	0	0	NC	NC	NC	NC
1322		3	0	0	NC	NC	NC	NC
1323		4	0	0	NC	NC	NC	NC
1324		5	0	0	NC	NC	NC	NC
1325	19	M15	1	0	0	NC	NC	NC
1326		2	0	0	NC	NC	NC	NC
1327		3	0	0	NC	NC	NC	NC
1328		4	0	0	NC	NC	NC	NC
1329		5	0	0	NC	NC	NC	NC
1330	20	M1	1	0	0	NC	NC	NC
1331		2	0	0	NC	NC	NC	NC
1332		3	0	0	NC	NC	NC	NC
1333		4	0	0	NC	NC	NC	NC
1334		5	0	0	NC	NC	NC	NC
1335	20	M2	1	0	0	NC	NC	NC
1336		2	0	0	NC	NC	NC	NC
1337		3	0	0	NC	NC	NC	NC
1338		4	0	0	NC	NC	NC	NC
1339		5	0	0	NC	NC	NC	NC
1340	20	M4	1	0	0	NC	NC	NC
1341		2	0	0	NC	NC	NC	NC
1342		3	0	0	NC	NC	NC	NC
1343		4	0	0	NC	NC	NC	NC
1344		5	0	0	NC	NC	NC	NC
1345	20	M5	1	0	0	NC	NC	NC
1346		2	0	0	NC	NC	NC	NC
1347		3	0	0	NC	NC	NC	NC
1348		4	0	0	NC	NC	NC	NC
1349		5	0	0	NC	NC	NC	NC
1350	20	M6	1	0	0	NC	NC	NC
1351		2	0	0	NC	NC	NC	NC
1352		3	0	0	NC	NC	NC	NC
1353		4	0	0	NC	NC	NC	NC
1354		5	0	0	NC	NC	NC	NC
1355	20	M10	1	0	0	NC	NC	NC
1356		2	0	0	NC	NC	NC	NC
1357		3	0	0	NC	NC	NC	NC
1358		4	0	0	NC	NC	NC	NC
1359		5	0	0	NC	NC	NC	NC
1360	20	M7	1	0	0	NC	NC	NC
1361		2	0	0	NC	NC	NC	NC
1362		3	0	0	NC	NC	NC	NC
1363		4	0	0	NC	NC	NC	NC
1364		5	0	0	NC	NC	NC	NC
1365	20	M8	1	0	0	NC	NC	NC
1366		2	0	0	NC	NC	NC	NC
1367		3	0	0	NC	NC	NC	NC
1368		4	0	0	NC	NC	NC	NC

Member Torsion Stresses (Continued)

LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
1369		5	0	0	NC	NC	NC	NC
1370	20	M9	1	0	0	NC	NC	NC
1371		2	0	0	NC	NC	NC	NC
1372		3	0	0	NC	NC	NC	NC
1373		4	0	0	NC	NC	NC	NC
1374		5	0	0	NC	NC	NC	NC
1375	20	M11	1	0	0	NC	NC	NC
1376		2	0	0	NC	NC	NC	NC
1377		3	0	0	NC	NC	NC	NC
1378		4	0	0	NC	NC	NC	NC
1379		5	0	0	NC	NC	NC	NC
1380	20	M12	1	0	0	NC	NC	NC
1381		2	0	0	NC	NC	NC	NC
1382		3	0	0	NC	NC	NC	NC
1383		4	0	0	NC	NC	NC	NC
1384		5	0	0	NC	NC	NC	NC
1385	20	M13	1	0	0	NC	NC	NC
1386		2	0	0	NC	NC	NC	NC
1387		3	0	0	NC	NC	NC	NC
1388		4	0	0	NC	NC	NC	NC
1389		5	0	0	NC	NC	NC	NC
1390	20	M14	1	0	0	NC	NC	NC
1391		2	0	0	NC	NC	NC	NC
1392		3	0	0	NC	NC	NC	NC
1393		4	0	0	NC	NC	NC	NC
1394		5	0	0	NC	NC	NC	NC
1395	20	M15	1	0	0	NC	NC	NC
1396		2	0	0	NC	NC	NC	NC
1397		3	0	0	NC	NC	NC	NC
1398		4	0	0	NC	NC	NC	NC
1399		5	0	0	NC	NC	NC	NC
1400	21	M1	1	0	0	NC	NC	NC
1401		2	0	0	NC	NC	NC	NC
1402		3	0	0	NC	NC	NC	NC
1403		4	0	0	NC	NC	NC	NC
1404		5	0	0	NC	NC	NC	NC
1405	21	M2	1	0	0	NC	NC	NC
1406		2	0	0	NC	NC	NC	NC
1407		3	0	0	NC	NC	NC	NC
1408		4	0	0	NC	NC	NC	NC
1409		5	0	0	NC	NC	NC	NC
1410	21	M4	1	0	0	NC	NC	NC
1411		2	0	0	NC	NC	NC	NC
1412		3	0	0	NC	NC	NC	NC
1413		4	0	0	NC	NC	NC	NC
1414		5	0	0	NC	NC	NC	NC
1415	21	M5	1	0	0	NC	NC	NC
1416		2	0	0	NC	NC	NC	NC
1417		3	0	0	NC	NC	NC	NC
1418		4	0	0	NC	NC	NC	NC
1419		5	0	0	NC	NC	NC	NC
1420	21	M6	1	0	0	NC	NC	NC
1421		2	0	0	NC	NC	NC	NC
1422		3	0	0	NC	NC	NC	NC
1423		4	0	0	NC	NC	NC	NC
1424		5	0	0	NC	NC	NC	NC
1425	21	M10	1	0	0	NC	NC	NC
1426		2	0	0	NC	NC	NC	NC
1427		3	0	0	NC	NC	NC	NC
1428		4	0	0	NC	NC	NC	NC
1429		5	0	0	NC	NC	NC	NC
1430	21	M7	1	0	0	NC	NC	NC
1431		2	0	0	NC	NC	NC	NC
1432		3	0	0	NC	NC	NC	NC
1433		4	0	0	NC	NC	NC	NC
1434		5	0	0	NC	NC	NC	NC
1435	21	M8	1	0	0	NC	NC	NC
1436		2	0	0	NC	NC	NC	NC

Member Torsion Stresses (Continued)

LC	Member Label	Sec	Torque[k-ft]	Shear[ksi]	y Warp Shear[ksi]	z Warp Shear[ksi]	z-Bot Warp Bend[ksi]	z-Top Warp Bend[ksi]
1437		3	0	0	NC	NC	NC	NC
1438		4	0	0	NC	NC	NC	NC
1439		5	0	0	NC	NC	NC	NC
1440	21	M9	1	0	0	NC	NC	NC
1441		2	0	0	NC	NC	NC	NC
1442		3	0	0	NC	NC	NC	NC
1443		4	0	0	NC	NC	NC	NC
1444		5	0	0	NC	NC	NC	NC
1445	21	M11	1	0	0	NC	NC	NC
1446		2	0	0	NC	NC	NC	NC
1447		3	0	0	NC	NC	NC	NC
1448		4	0	0	NC	NC	NC	NC
1449		5	0	0	NC	NC	NC	NC
1450	21	M12	1	0	0	NC	NC	NC
1451		2	0	0	NC	NC	NC	NC
1452		3	0	0	NC	NC	NC	NC
1453		4	0	0	NC	NC	NC	NC
1454		5	0	0	NC	NC	NC	NC
1455	21	M13	1	0	0	NC	NC	NC
1456		2	0	0	NC	NC	NC	NC
1457		3	0	0	NC	NC	NC	NC
1458		4	0	0	NC	NC	NC	NC
1459		5	0	0	NC	NC	NC	NC
1460	21	M14	1	0	0	NC	NC	NC
1461		2	0	0	NC	NC	NC	NC
1462		3	0	0	NC	NC	NC	NC
1463		4	0	0	NC	NC	NC	NC
1464		5	0	0	NC	NC	NC	NC
1465	21	M15	1	0	0	NC	NC	NC
1466		2	0	0	NC	NC	NC	NC
1467		3	0	0	NC	NC	NC	NC
1468		4	0	0	NC	NC	NC	NC
1469		5	0	0	NC	NC	NC	NC

Member Section Stresses

	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
0	1	M1	1	0.813	-0.044	0	0	0	0	0
1			2	0.813	-0.014	0	-0.26	0.26	0	0
2			3	0.813	0.016	0	-0.251	0.251	0	0
3			4	0.813	0.046	0	0.026	-0.026	0	0
4			5	0.813	0.076	0	0.571	-0.571	0	0
5	1	M2	1	0.532	-0.08	0	0.571	-0.571	0	0
6			2	0.532	-0.047	0	-0.048	0.048	0	0
7			3	0.532	-0.015	0	-0.349	0.349	0	0
8			4	0.532	0.018	0	-0.333	0.333	0	0
9			5	0.532	0.051	0	0	0	0	0
10	1	M4	1	0.139	-0.044	0	0	0	0	0
11			2	0.139	-0.014	0	-0.258	0.258	0	0
12			3	0.139	0.016	0	-0.248	0.248	0	0
13			4	0.139	0.046	0	0.03	-0.03	0	0
14			5	0.139	0.076	0	0.577	-0.577	0	0
15	1	M5	1	0.414	-0.08	0	0.577	-0.577	0	0
16			2	0.414	-0.048	0	-0.043	0.043	0	0
17			3	0.414	-0.015	0	-0.346	0.346	0	0
18			4	0.414	0.018	0	-0.332	0.332	0	0
19			5	0.414	0.051	0	0	0	0	0
20	1	M6	1	-0.053	1.525	0	0	0	0	0
21			2	-0.066	0.762	0	4.749	-4.749	0	0
22			3	-0.08	0	0	6.332	-6.332	0	0
23			4	-0.093	-0.762	0	4.749	-4.749	0	0
24			5	-0.106	-1.525	0	0	0	0	0
25	1	M10	1	-0.114	0	0	0	0	0	0
26			2	-0.127	0	0	0	0	0	0
27			3	-0.14	0	0	0	0	0	0
28			4	-0.154	0	0	0	0	0	0
29			5	-0.167	0	0	0	0	0	0
30	1	M7	1	0.05	0.025	0	0	0	0	0
31			2	0.042	0.008	0	0.181	-0.181	0	0

Member Section Stresses (Continued)

LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
32		3	0.035	-0.008	0	0.181	-0.181	0	0
33		4	0.028	-0.025	0	0	0	0	0
34		5	0.021	-0.042	0	-0.362	0.362	0	0
35	1	M8	1	0.733	-0.023	0	0	0	0
36		2	0.74	-0.007	0	-0.156	0.156	0	0
37		3	0.748	0.008	0	-0.153	0.153	0	0
38		4	0.755	0.023	0	0.01	-0.01	0	0
39		5	0.762	0.039	0	0.332	-0.332	0	0
40	1	M9	1	-0.012	0.042	0	-0.362	0.362	0
41		2	-0.019	0.025	0	0	0	0	0
42		3	-0.026	0.008	0	0.181	-0.181	0	0
43		4	-0.033	-0.008	0	0.181	-0.181	0	0
44		5	-0.041	-0.025	0	0	0	0	0
45	1	M11	1	0.789	-0.039	0	0.332	-0.332	0
46		2	0.796	-0.023	0	0.01	-0.01	0	0
47		3	0.804	-0.008	0	-0.153	0.153	0	0
48		4	0.811	0.007	0	-0.156	0.156	0	0
49		5	0.818	0.023	0	0	0	0	0
50	1	M12	1	0.346	-0.033	0	0	0	0
51		2	0.353	-0.017	0	-0.272	0.272	0	0
52		3	0.36	0	0	-0.362	0.362	0	0
53		4	0.367	0.017	0	-0.272	0.272	0	0
54		5	0.374	0.033	0	0	0	0	0
55	1	M13	1	0.414	-0.033	0	0	0	0
56		2	0.421	-0.017	0	-0.272	0.272	0	0
57		3	0.429	0	0	-0.362	0.362	0	0
58		4	0.436	0.017	0	-0.272	0.272	0	0
59		5	0.443	0.033	0	0	0	0	0
60	1	M14	1	-0.335	0.031	0	0	0	0
61		2	-0.342	0.015	0	0.239	-0.239	0	0
62		3	-0.35	0	0	0.319	-0.319	0	0
63		4	-0.357	-0.015	0	0.239	-0.239	0	0
64		5	-0.364	-0.031	0	0	0	0	0
65	1	M15	1	-0.399	0.031	0	0	0	0
66		2	-0.406	0.015	0	0.239	-0.239	0	0
67		3	-0.413	0	0	0.319	-0.319	0	0
68		4	-0.42	-0.015	0	0.239	-0.239	0	0
69		5	-0.427	-0.031	0	0	0	0	0
70	2	M1	1	0.325	0	0	0	0	0
71		2	0.325	0	0	0	0	0	0
72		3	0.325	0	0	-0.001	0.001	0	0
73		4	0.325	0	0	-0.001	0.001	0	0
74		5	0.325	0	0	-0.002	0.002	0	0
75	2	M2	1	0.003	0	-0.002	0.002	0	0
76		2	0.003	0	0	-0.001	0.001	0	0
77		3	0.003	0	0	-0.001	0.001	0	0
78		4	0.003	0	0	0	0	0	0
79		5	0.003	0	0	0	0	0	0
80	2	M4	1	0.325	0	0	0	0	0
81		2	0.325	0	0	0	0	0	0
82		3	0.325	0	0	0.001	-0.001	0	0
83		4	0.325	0	0	0.001	-0.001	0	0
84		5	0.325	0	0	0.002	-0.002	0	0
85	2	M5	1	0.003	0	0.002	-0.002	0	0
86		2	0.003	0	0	0.001	-0.001	0	0
87		3	0.003	0	0	0.001	-0.001	0	0
88		4	0.003	0	0	0	0	0	0
89		5	0.003	0	0	0	0	0	0
90	2	M6	1	0.004	0	0	0	0	0
91		2	0.004	0	0	0	0	0	0
92		3	0.004	0	0	0	0	0	0
93		4	0.004	0	0	0	0	0	0
94		5	0.004	0	0	0	0	0	0
95	2	M10	1	-0.049	0.835	0	0	0	0
96		2	-0.049	0.418	0	2.451	-2.451	0	0
97		3	-0.049	0	0	3.268	-3.268	0	0
98		4	-0.049	-0.418	0	2.451	-2.451	0	0
99		5	-0.049	-0.835	0	0	0	0	0

Member Section Stresses (Continued)

LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
100	2	M7	1	-0.009	0	0	0	0	0
101			2	-0.009	0	0	0	0	0
102			3	-0.009	0	0.001	-0.001	0	0
103			4	-0.009	0	0.001	-0.001	0	0
104			5	-0.009	0	0.001	-0.001	0	0
105	2	M8	1	0.146	0	0	0	0	0
106			2	0.146	0	0	0	0	0
107			3	0.146	0	-0.001	0.001	0	0
108			4	0.146	0	-0.001	0.001	0	0
109			5	0.146	0	-0.001	0.001	0	0
110	2	M9	1	-0.009	0	0.001	-0.001	0	0
111			2	-0.009	0	0.001	-0.001	0	0
112			3	-0.009	0	0.001	-0.001	0	0
113			4	-0.009	0	0	0	0	0
114			5	-0.009	0	0	0	0	0
115	2	M11	1	0.146	0	-0.001	0.001	0	0
116			2	0.146	0	-0.001	0.001	0	0
117			3	0.146	0	-0.001	0.001	0	0
118			4	0.146	0	0	0	0	0
119			5	0.146	0	0	0	0	0
120	2	M12	1	-0.009	0	0	0	0	0
121			2	-0.009	0	0	0	0	0
122			3	-0.009	0	0	0	0	0
123			4	-0.009	0	0	0	0	0
124			5	-0.009	0	0	0	0	0
125	2	M13	1	-0.009	0	0	0	0	0
126			2	-0.009	0	0	0	0	0
127			3	-0.009	0	0	0	0	0
128			4	-0.009	0	0	0	0	0
129			5	-0.009	0	0	0	0	0
130	2	M14	1	0.146	0	0	0	0	0
131			2	0.146	0	0	0	0	0
132			3	0.146	0	0	0	0	0
133			4	0.146	0	0	0	0	0
134			5	0.146	0	0	0	0	0
135	2	M15	1	0.146	0	0	0	0	0
136			2	0.146	0	0	0	0	0
137			3	0.146	0	0	0	0	0
138			4	0.146	0	0	0	0	0
139			5	0.146	0	0	0	0	0
140	3	M1	1	1.138	-0.044	0	0	0	0
141			2	1.138	-0.014	0	-0.26	0.26	0
142			3	1.138	0.016	0	-0.252	0.252	0
143			4	1.138	0.046	0	0.024	-0.024	0
144			5	1.138	0.076	0	0.569	-0.569	0
145	3	M2	1	0.535	-0.08	0	0.569	-0.569	0
146			2	0.535	-0.047	0	-0.049	0.049	0
147			3	0.535	-0.015	0	-0.35	0.35	0
148			4	0.535	0.018	0	-0.334	0.334	0
149			5	0.535	0.051	0	0	0	0
150	3	M4	1	0.464	-0.044	0	0	0	0
151			2	0.464	-0.014	0	-0.258	0.258	0
152			3	0.464	0.016	0	-0.247	0.247	0
153			4	0.464	0.046	0	0.031	-0.031	0
154			5	0.464	0.076	0	0.579	-0.579	0
155	3	M5	1	0.417	-0.08	0	0.579	-0.579	0
156			2	0.417	-0.048	0	-0.042	0.042	0
157			3	0.417	-0.015	0	-0.345	0.345	0
158			4	0.417	0.018	0	-0.331	0.331	0
159			5	0.417	0.05	0	0	0	0
160	3	M6	1	-0.049	1.525	0	0	0	0
161			2	-0.063	0.762	0	4.749	-4.749	0
162			3	-0.076	0	0	6.332	-6.332	0
163			4	-0.089	-0.762	0	4.749	-4.749	0
164			5	-0.103	-1.525	0	0	0	0
165	3	M10	1	-0.162	0.835	0	0	0	0
166			2	-0.176	0.418	0	2.451	-2.451	0
167			3	-0.189	0	0	3.268	-3.268	0

Member Section Stresses (Continued)

LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
168		4	-0.202	-0.418	0	2.451	-2.451	0	0
169		5	-0.216	-0.835	0	0	0	0	0
170	3	1	0.041	0.025	0	0	0	0	0
171		2	0.034	0.008	0	0.181	-0.181	0	0
172		3	0.026	-0.008	0	0.182	-0.182	0	0
173		4	0.019	-0.025	0	0.001	-0.001	0	0
174		5	0.012	-0.042	0	-0.361	0.361	0	0
175	3	1	0.88	-0.023	0	0	0	0	0
176		2	0.887	-0.007	0	-0.157	0.157	0	0
177		3	0.894	0.008	0	-0.154	0.154	0	0
178		4	0.901	0.023	0	0.009	-0.009	0	0
179		5	0.908	0.039	0	0.331	-0.331	0	0
180	3	1	-0.021	0.042	0	-0.361	0.361	0	0
181		2	-0.028	0.025	0	0.001	-0.001	0	0
182		3	-0.035	0.008	0	0.182	-0.182	0	0
183		4	-0.042	-0.008	0	0.181	-0.181	0	0
184		5	-0.05	-0.025	0	0	0	0	0
185	3	1	0.936	-0.039	0	0.331	-0.331	0	0
186		2	0.943	-0.023	0	0.009	-0.009	0	0
187		3	0.95	-0.008	0	-0.154	0.154	0	0
188		4	0.957	0.007	0	-0.157	0.157	0	0
189		5	0.964	0.023	0	0	0	0	0
190	3	1	0.337	-0.033	0	0	0	0	0
191		2	0.344	-0.017	0	-0.272	0.272	0	0
192		3	0.351	0	0	-0.362	0.362	0	0
193		4	0.358	0.017	0	-0.272	0.272	0	0
194		5	0.365	0.033	0	0	0	0	0
195	3	1	0.405	-0.033	0	0	0	0	0
196		2	0.413	-0.017	0	-0.272	0.272	0	0
197		3	0.42	0	0	-0.362	0.362	0	0
198		4	0.427	0.017	0	-0.272	0.272	0	0
199		5	0.434	0.033	0	0	0	0	0
200	3	1	-0.189	0.031	0	0	0	0	0
201		2	-0.196	0.015	0	0.239	-0.239	0	0
202		3	-0.203	0	0	0.319	-0.319	0	0
203		4	-0.21	-0.015	0	0.239	-0.239	0	0
204		5	-0.218	-0.031	0	0	0	0	0
205	3	1	-0.252	0.031	0	0	0	0	0
206		2	-0.259	0.015	0	0.239	-0.239	0	0
207		3	-0.267	0	0	0.319	-0.319	0	0
208		4	-0.274	-0.015	0	0.239	-0.239	0	0
209		5	-0.281	-0.031	0	0	0	0	0
210	4	1	1.139	-0.062	0	0	0	0	0
211		2	1.139	-0.02	0	-0.364	0.364	0	0
212		3	1.139	0.022	0	-0.352	0.352	0	0
213		4	1.139	0.064	0	0.036	-0.036	0	0
214		5	1.139	0.107	0	0.799	-0.799	0	0
215	4	1	0.745	-0.112	0	0.799	-0.799	0	0
216		2	0.745	-0.066	0	-0.067	0.067	0	0
217		3	0.745	-0.021	0	-0.489	0.489	0	0
218		4	0.745	0.025	0	-0.467	0.467	0	0
219		5	0.745	0.071	0	0	0	0	0
220	4	1	0.195	-0.062	0	0	0	0	0
221		2	0.195	-0.019	0	-0.362	0.362	0	0
222		3	0.195	0.023	0	-0.347	0.347	0	0
223		4	0.195	0.065	0	0.042	-0.042	0	0
224		5	0.195	0.107	0	0.808	-0.808	0	0
225	4	1	0.579	-0.112	0	0.808	-0.808	0	0
226		2	0.579	-0.067	0	-0.06	0.06	0	0
227		3	0.579	-0.021	0	-0.484	0.484	0	0
228		4	0.579	0.025	0	-0.464	0.464	0	0
229		5	0.579	0.071	0	0	0	0	0
230	4	1	-0.074	2.134	0	0	0	0	0
231		2	-0.093	1.067	0	6.648	-6.648	0	0
232		3	-0.112	0	0	8.864	-8.864	0	0
233		4	-0.13	-1.067	0	6.648	-6.648	0	0
234		5	-0.149	-2.134	0	0	0	0	0
235	4	1	-0.159	0	0	0	0	0	0

Member Section Stresses (Continued)

LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
236		2	-0.178	0	0	0	0	0	0
237		3	-0.196	0	0	0	0	0	0
238		4	-0.215	0	0	0	0	0	0
239		5	-0.234	0	0	0	0	0	0
240	4	M7	1	0.069	0.035	0	0	0	0
241		2	0.059	0.012	0	0.254	-0.254	0	0
242		3	0.049	-0.012	0	0.254	-0.254	0	0
243		4	0.039	-0.035	0	0	0	0	0
244		5	0.029	-0.058	0	-0.507	0.507	0	0
245	4	M8	1	1.027	-0.032	0	0	0	0
246		2	1.037	-0.01	0	-0.219	0.219	0	0
247		3	1.047	0.011	0	-0.214	0.214	0	0
248		4	1.057	0.033	0	0.014	-0.014	0	0
249		5	1.067	0.054	0	0.465	-0.465	0	0
250	4	M9	1	-0.017	0.058	0	-0.507	0.507	0
251		2	-0.027	0.035	0	0	0	0	0
252		3	-0.037	0.012	0	0.254	-0.254	0	0
253		4	-0.047	-0.012	0	0.254	-0.254	0	0
254		5	-0.057	-0.035	0	0	0	0	0
255	4	M11	1	1.105	-0.054	0	0.465	-0.465	0
256		2	1.115	-0.033	0	0.014	-0.014	0	0
257		3	1.125	-0.011	0	-0.214	0.214	0	0
258		4	1.135	0.01	0	-0.219	0.219	0	0
259		5	1.145	0.032	0	0	0	0	0
260	4	M12	1	0.484	-0.047	0	0	0	0
261		2	0.494	-0.023	0	-0.38	0.38	0	0
262		3	0.504	0	0	-0.507	0.507	0	0
263		4	0.514	0.023	0	-0.38	0.38	0	0
264		5	0.524	0.047	0	0	0	0	0
265	4	M13	1	0.58	-0.047	0	0	0	0
266		2	0.59	-0.023	0	-0.38	0.38	0	0
267		3	0.6	0	0	-0.507	0.507	0	0
268		4	0.61	0.023	0	-0.38	0.38	0	0
269		5	0.62	0.047	0	0	0	0	0
270	4	M14	1	-0.469	0.043	0	0	0	0
271		2	-0.479	0.022	0	0.335	-0.335	0	0
272		3	-0.489	0	0	0.447	-0.447	0	0
273		4	-0.499	-0.022	0	0.335	-0.335	0	0
274		5	-0.509	-0.043	0	0	0	0	0
275	4	M15	1	-0.558	0.043	0	0	0	0
276		2	-0.568	0.022	0	0.335	-0.335	0	0
277		3	-0.578	0	0	0.447	-0.447	0	0
278		4	-0.588	-0.022	0	0.335	-0.335	0	0
279		5	-0.598	-0.043	0	0	0	0	0
280	5	M1	1	1.734	-0.053	0	0	0	0
281		2	1.734	-0.017	0	-0.313	0.313	0	0
282		3	1.734	0.019	0	-0.303	0.303	0	0
283		4	1.734	0.055	0	0.028	-0.028	0	0
284		5	1.734	0.091	0	0.681	-0.681	0	0
285	5	M2	1	0.88	-0.096	0	0.681	-0.681	0
286		2	0.88	-0.057	0	-0.06	0.06	0	0
287		3	0.88	-0.018	0	-0.421	0.421	0	0
288		4	0.88	0.022	0	-0.401	0.401	0	0
289		5	0.88	0.061	0	0	0	0	0
290	5	M4	1	0.925	-0.053	0	0	0	0
291		2	0.925	-0.017	0	-0.309	0.309	0	0
292		3	0.925	0.02	0	-0.296	0.296	0	0
293		4	0.925	0.056	0	0.039	-0.039	0	0
294		5	0.925	0.092	0	0.697	-0.697	0	0
295	5	M5	1	0.738	-0.096	0	0.697	-0.697	0
296		2	0.738	-0.057	0	-0.049	0.049	0	0
297		3	0.738	-0.018	0	-0.413	0.413	0	0
298		4	0.738	0.021	0	-0.397	0.397	0	0
299		5	0.738	0.061	0	0	0	0	0
300	5	M6	1	-0.098	2.592	0	0	0	0
301		2	-0.114	1.296	0	8.073	-8.073	0	0
302		3	-0.13	0	0	10.764	-10.764	0	0
303		4	-0.146	-1.296	0	8.073	-8.073	0	0

Member Section Stresses (Continued)

LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
304		5	-0.162	-2.592	0	0	0	0	0
305	5	M10	1	-0.283	1.336	0	0	0	0
306		2	-0.299	0.668	0	3.922	-3.922	0	0
307		3	-0.315	0	0	5.229	-5.229	0	0
308		4	-0.331	-0.668	0	3.922	-3.922	0	0
309		5	-0.347	-1.336	0	0	0	0	0
310	5	M7	1	0.145	0.03	0	0	0	0
311		2	0.136	0.01	0	0.218	-0.218	0	0
312		3	0.128	-0.01	0	0.219	-0.219	0	0
313		4	0.119	-0.03	0	0.002	-0.002	0	0
314		5	0.111	-0.05	0	-0.432	0.432	0	0
315	5	M8	1	1.213	-0.027	0	0	0	0
316		2	1.222	-0.009	0	-0.189	0.189	0	0
317		3	1.23	0.009	0	-0.186	0.186	0	0
318		4	1.239	0.028	0	0.008	-0.008	0	0
319		5	1.248	0.046	0	0.394	-0.394	0	0
320	5	M9	1	0.071	0.05	0	-0.432	0.432	0
321		2	0.063	0.03	0	0.002	-0.002	0	0
322		3	0.054	0.01	0	0.219	-0.219	0	0
323		4	0.045	-0.01	0	0.218	-0.218	0	0
324		5	0.037	-0.03	0	0	0	0	0
325	5	M11	1	1.28	-0.046	0	0.394	-0.394	0
326		2	1.289	-0.028	0	0.008	-0.008	0	0
327		3	1.298	-0.009	0	-0.186	0.186	0	0
328		4	1.306	0.009	0	-0.189	0.189	0	0
329		5	1.315	0.027	0	0	0	0	0
330	5	M12	1	0.5	-0.04	0	0	0	0
331		2	0.509	-0.02	0	-0.326	0.326	0	0
332		3	0.518	0	0	-0.435	0.435	0	0
333		4	0.526	0.02	0	-0.326	0.326	0	0
334		5	0.535	0.04	0	0	0	0	0
335	5	M13	1	0.583	-0.04	0	0	0	0
336		2	0.591	-0.02	0	-0.326	0.326	0	0
337		3	0.6	0	0	-0.435	0.435	0	0
338		4	0.609	0.02	0	-0.326	0.326	0	0
339		5	0.617	0.04	0	0	0	0	0
340	5	M14	1	-0.069	0.037	0	0	0	0
341		2	-0.078	0.018	0	0.287	-0.287	0	0
342		3	-0.087	0	0	0.383	-0.383	0	0
343		4	-0.095	-0.018	0	0.287	-0.287	0	0
344		5	-0.104	-0.037	0	0	0	0	0
345	5	M15	1	-0.145	0.037	0	0	0	0
346		2	-0.154	0.018	0	0.287	-0.287	0	0
347		3	-0.163	0	0	0.383	-0.383	0	0
348		4	-0.171	-0.018	0	0.287	-0.287	0	0
349		5	-0.18	-0.037	0	0	0	0	0
350	6	M1	1	1.496	-0.053	0	0	0	0
351		2	1.496	-0.017	0	-0.312	0.312	0	0
352		3	1.496	0.019	0	-0.303	0.303	0	0
353		4	1.496	0.055	0	0.029	-0.029	0	0
354		5	1.496	0.091	0	0.683	-0.683	0	0
355	6	M2	1	0.643	-0.096	0	0.683	-0.683	0
356		2	0.643	-0.057	0	-0.059	0.059	0	0
357		3	0.643	-0.018	0	-0.42	0.42	0	0
358		4	0.643	0.022	0	-0.401	0.401	0	0
359		5	0.643	0.061	0	0	0	0	0
360	6	M4	1	0.687	-0.053	0	0	0	0
361		2	0.687	-0.017	0	-0.309	0.309	0	0
362		3	0.687	0.019	0	-0.297	0.297	0	0
363		4	0.687	0.056	0	0.038	-0.038	0	0
364		5	0.687	0.092	0	0.695	-0.695	0	0
365	6	M5	1	0.501	-0.096	0	0.695	-0.695	0
366		2	0.501	-0.057	0	-0.05	0.05	0	0
367		3	0.501	-0.018	0	-0.414	0.414	0	0
368		4	0.501	0.021	0	-0.397	0.397	0	0
369		5	0.501	0.061	0	0	0	0	0
370	6	M6	1	-0.058	1.829	0	0	0	0
371		2	-0.074	0.915	0	5.699	-5.699	0	0

Member Section Stresses (Continued)

LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
372		3	-0.09	0	0	7.598	-7.598	0	0
373		4	-0.106	-0.915	0	5.699	-5.699	0	0
374		5	-0.122	-1.829	0	0	0	0	0
375	6	M10	1	-0.214	1.336	0	0	0	0
376		2	-0.23	0.668	0	3.922	-3.922	0	0
377		3	-0.246	0	0	5.229	-5.229	0	0
378		4	-0.262	-0.668	0	3.922	-3.922	0	0
379		5	-0.278	-1.336	0	0	0	0	0
380	6	M7	1	0.045	0.03	0	0	0	0
381		2	0.037	0.01	0	0.218	-0.218	0	0
382		3	0.028	-0.01	0	0.218	-0.218	0	0
383		4	0.02	-0.03	0	0.002	-0.002	0	0
384		5	0.011	-0.05	0	-0.432	0.432	0	0
385	6	M8	1	1.114	-0.027	0	0	0	0
386		2	1.123	-0.009	0	-0.188	0.188	0	0
387		3	1.132	0.01	0	-0.185	0.185	0	0
388		4	1.14	0.028	0	0.01	-0.01	0	0
389		5	1.149	0.046	0	0.396	-0.396	0	0
390	6	M9	1	-0.029	0.05	0	-0.432	0.432	0
391		2	-0.037	0.03	0	0.002	-0.002	0	0
392		3	-0.046	0.01	0	0.218	-0.218	0	0
393		4	-0.054	-0.01	0	0.218	-0.218	0	0
394		5	-0.063	-0.03	0	0	0	0	0
395	6	M11	1	1.182	-0.046	0	0.396	-0.396	0
396		2	1.19	-0.028	0	0.01	-0.01	0	0
397		3	1.199	-0.01	0	-0.185	0.185	0	0
398		4	1.207	0.009	0	-0.188	0.188	0	0
399		5	1.216	0.027	0	0	0	0	0
400	6	M12	1	0.4	-0.04	0	0	0	0
401		2	0.409	-0.02	0	-0.326	0.326	0	0
402		3	0.418	0	0	-0.435	0.435	0	0
403		4	0.426	0.02	0	-0.326	0.326	0	0
404		5	0.435	0.04	0	0	0	0	0
405	6	M13	1	0.483	-0.04	0	0	0	0
406		2	0.492	-0.02	0	-0.326	0.326	0	0
407		3	0.5	0	0	-0.435	0.435	0	0
408		4	0.509	0.02	0	-0.326	0.326	0	0
409		5	0.517	0.04	0	0	0	0	0
410	6	M14	1	-0.168	0.037	0	0	0	0
411		2	-0.177	0.018	0	0.287	-0.287	0	0
412		3	-0.185	0	0	0.383	-0.383	0	0
413		4	-0.194	-0.018	0	0.287	-0.287	0	0
414		5	-0.203	-0.037	0	0	0	0	0
415	6	M15	1	-0.244	0.037	0	0	0	0
416		2	-0.253	0.018	0	0.287	-0.287	0	0
417		3	-0.261	0	0	0.383	-0.383	0	0
418		4	-0.27	-0.018	0	0.287	-0.287	0	0
419		5	-0.279	-0.037	0	0	0	0	0
420	7	M1	1	1.901	-0.053	0	0	0	0
421		2	1.901	-0.017	0	-0.313	0.313	0	0
422		3	1.901	0.019	0	-0.304	0.304	0	0
423		4	1.901	0.055	0	0.027	-0.027	0	0
424		5	1.901	0.091	0	0.679	-0.679	0	0
425	7	M2	1	1.396	-0.096	0	0.679	-0.679	0
426		2	1.396	-0.057	0	-0.062	0.062	0	0
427		3	1.396	-0.017	0	-0.422	0.422	0	0
428		4	1.396	0.022	0	-0.401	0.401	0	0
429		5	1.396	0.061	0	0	0	0	0
430	7	M4	1	1.092	-0.053	0	0	0	0
431		2	1.092	-0.017	0	-0.308	0.308	0	0
432		3	1.092	0.02	0	-0.295	0.295	0	0
433		4	1.092	0.056	0	0.041	-0.041	0	0
434		5	1.092	0.092	0	0.698	-0.698	0	0
435	7	M5	1	1.254	-0.096	0	0.698	-0.698	0
436		2	1.254	-0.057	0	-0.048	0.048	0	0
437		3	1.254	-0.018	0	-0.412	0.412	0	0
438		4	1.254	0.021	0	-0.397	0.397	0	0
439		5	1.254	0.06	0	0	0	0	0

Member Section Stresses (Continued)

LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
440	7	M6	1	-0.192	4.269	0	0	0	0
441			2	-0.208	2.134	13.297	-13.297	0	0
442			3	-0.224	0	17.729	-17.729	0	0
443			4	-0.24	-2.134	13.297	-13.297	0	0
444			5	-0.256	-4.269	0	0	0	0
445	7	M10	1	-0.381	0.418	0	0	0	0
446			2	-0.397	0.209	1.226	-1.226	0	0
447			3	-0.413	0	1.634	-1.634	0	0
448			4	-0.429	-0.209	1.226	-1.226	0	0
449			5	-0.445	-0.418	0	0	0	0
450	7	M7	1	0.374	0.03	0	0	0	0
451			2	0.366	0.01	0.218	-0.218	0	0
452			3	0.357	-0.01	0.219	-0.219	0	0
453			4	0.348	-0.03	0.002	-0.002	0	0
454			5	0.34	-0.05	-0.432	0.432	0	0
455	7	M8	1	1.27	-0.027	0	0	0	0
456			2	1.278	-0.009	-0.189	0.189	0	0
457			3	1.287	0.009	-0.187	0.187	0	0
458			4	1.296	0.028	0.006	-0.006	0	0
459			5	1.304	0.046	0.391	-0.391	0	0
460	7	M9	1	0.3	0.05	-0.432	0.432	0	0
461			2	0.292	0.03	0.002	-0.002	0	0
462			3	0.283	0.01	0.219	-0.219	0	0
463			4	0.274	-0.01	0.218	-0.218	0	0
464			5	0.266	-0.03	0	0	0	0
465	7	M11	1	1.337	-0.046	0.391	-0.391	0	0
466			2	1.346	-0.028	0.006	-0.006	0	0
467			3	1.354	-0.009	-0.187	0.187	0	0
468			4	1.363	0.009	-0.189	0.189	0	0
469			5	1.371	0.027	0	0	0	0
470	7	M12	1	0.73	-0.04	0	0	0	0
471			2	0.738	-0.02	-0.326	0.326	0	0
472			3	0.747	0	-0.435	0.435	0	0
473			4	0.756	0.02	-0.326	0.326	0	0
474			5	0.764	0.04	0	0	0	0
475	7	M13	1	0.812	-0.04	0	0	0	0
476			2	0.821	-0.02	-0.326	0.326	0	0
477			3	0.829	0	-0.435	0.435	0	0
478			4	0.838	0.02	-0.326	0.326	0	0
479			5	0.847	0.04	0	0	0	0
480	7	M14	1	-0.013	0.037	0	0	0	0
481			2	-0.022	0.018	0.287	-0.287	0	0
482			3	-0.03	0	0.383	-0.383	0	0
483			4	-0.039	-0.018	0.287	-0.287	0	0
484			5	-0.048	-0.037	0	0	0	0
485	7	M15	1	-0.089	0.037	0	0	0	0
486			2	-0.098	0.018	0.287	-0.287	0	0
487			3	-0.106	0	0.383	-0.383	0	0
488			4	-0.115	-0.018	0.287	-0.287	0	0
489			5	-0.123	-0.037	0	0	0	0
490	8	M1	1	0.476	-0.054	0	0	0	0
491			2	0.476	-0.018	-0.318	0.318	0	0
492			3	0.476	0.018	-0.314	0.314	0	0
493			4	0.476	0.055	0.012	-0.012	0	0
494			5	0.476	0.091	0.66	-0.66	0	0
495	8	M2	1	0.995	-0.095	0.66	-0.66	0	0
496			2	0.995	-0.056	-0.076	0.076	0	0
497			3	0.995	-0.017	-0.431	0.431	0	0
498			4	0.995	0.022	-0.406	0.406	0	0
499			5	0.995	0.061	0	0	0	0
500	8	M4	1	2.169	-0.053	0	0	0	0
501			2	2.169	-0.017	-0.313	0.313	0	0
502			3	2.169	0.019	-0.305	0.305	0	0
503			4	2.169	0.055	0.026	-0.026	0	0
504			5	2.169	0.091	0.679	-0.679	0	0
505	8	M5	1	1.579	-0.096	0.679	-0.679	0	0
506			2	1.579	-0.057	-0.062	0.062	0	0
507			3	1.579	-0.017	-0.422	0.422	0	0

Member Section Stresses (Continued)

LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
508		4	1.579	0.022	0	-0.401	0.401	0	0
509		5	1.579	0.061	0	0	0	0	0
510	8	1	0.167	4.269	0	0	0	0	0
511		2	0.151	2.134	0	13.297	-13.297	0	0
512		3	0.135	0	0	17.729	-17.729	0	0
513		4	0.119	-2.134	0	13.297	-13.297	0	0
514		5	0.103	-4.269	0	0	0	0	0
515	8	1	-0.211	0	0	0	0	0	0
516		2	-0.227	0	0	0	0	0	0
517		3	-0.243	0	0	0	0	0	0
518		4	-0.259	0	0	0	0	0	0
519		5	-0.275	0	0	0	0	0	0
520	8	1	1.464	0.031	0	0	0	0	0
521		2	1.455	0.011	0	0.225	-0.225	0	0
522		3	1.447	-0.009	0	0.232	-0.232	0	0
523		4	1.438	-0.029	0	0.022	-0.022	0	0
524		5	1.43	-0.049	0	-0.406	0.406	0	0
525	8	1	-0.256	-0.029	0	0	0	0	0
526		2	-0.248	-0.011	0	-0.206	0.206	0	0
527		3	-0.239	0.008	0	-0.22	0.22	0	0
528		4	-0.23	0.026	0	-0.042	0.042	0	0
529		5	-0.222	0.045	0	0.327	-0.327	0	0
530	8	1	1.39	0.049	0	-0.406	0.406	0	0
531		2	1.382	0.029	0	0.022	-0.022	0	0
532		3	1.373	0.009	0	0.232	-0.232	0	0
533		4	1.364	-0.011	0	0.225	-0.225	0	0
534		5	1.356	-0.031	0	0	0	0	0
535	8	1	-0.189	-0.045	0	0.327	-0.327	0	0
536		2	-0.18	-0.026	0	-0.042	0.042	0	0
537		3	-0.172	-0.008	0	-0.22	0.22	0	0
538		4	-0.163	0.011	0	-0.206	0.206	0	0
539		5	-0.155	0.029	0	0	0	0	0
540	8	1	-0.152	-0.04	0	0	0	0	0
541		2	-0.144	-0.02	0	-0.326	0.326	0	0
542		3	-0.135	0	0	-0.435	0.435	0	0
543		4	-0.126	0.02	0	-0.326	0.326	0	0
544		5	-0.118	0.04	0	0	0	0	0
545	8	1	-0.07	-0.04	0	0	0	0	0
546		2	-0.062	-0.02	0	-0.326	0.326	0	0
547		3	-0.053	0	0	-0.435	0.435	0	0
548		4	-0.044	0.02	0	-0.326	0.326	0	0
549		5	-0.036	0.04	0	0	0	0	0
550	8	1	1.429	0.037	0	0	0	0	0
551		2	1.421	0.018	0	0.287	-0.287	0	0
552		3	1.412	0	0	0.383	-0.383	0	0
553		4	1.404	-0.018	0	0.287	-0.287	0	0
554		5	1.395	-0.037	0	0	0	0	0
555	8	1	1.355	0.037	0	0	0	0	0
556		2	1.346	0.018	0	0.287	-0.287	0	0
557		3	1.338	0	0	0.383	-0.383	0	0
558		4	1.329	-0.018	0	0.287	-0.287	0	0
559		5	1.321	-0.037	0	0	0	0	0
560	9	1	3.001	-0.053	0	0	0	0	0
561		2	3.001	-0.016	0	-0.308	0.308	0	0
562		3	3.001	0.02	0	-0.294	0.294	0	0
563		4	3.001	0.056	0	0.042	-0.042	0	0
564		5	3.001	0.092	0	0.7	-0.7	0	0
565	9	1	1.794	-0.096	0	0.7	-0.7	0	0
566		2	1.794	-0.057	0	-0.046	0.046	0	0
567		3	1.794	-0.018	0	-0.411	0.411	0	0
568		4	1.794	0.021	0	-0.396	0.396	0	0
569		5	1.794	0.06	0	0	0	0	0
570	9	1	-0.311	-0.052	0	0	0	0	0
571		2	-0.311	-0.016	0	-0.304	0.304	0	0
572		3	-0.311	0.02	0	-0.286	0.286	0	0
573		4	-0.311	0.056	0	0.054	-0.054	0	0
574		5	-0.311	0.092	0	0.716	-0.716	0	0
575	9	1	0.926	-0.097	0	0.716	-0.716	0	0

Member Section Stresses (Continued)

LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
576		2	0.926	-0.058	0	-0.034	0.034	0	0
577		3	0.926	-0.018	0	-0.404	0.404	0	0
578		4	0.926	0.021	0	-0.392	0.392	0	0
579		5	0.926	0.06	0	0	0	0	0
580	9	1	-0.554	4.269	0	0	0	0	0
581		2	-0.57	2.134	0	13.297	-13.297	0	0
582		3	-0.586	0	0	17.729	-17.729	0	0
583		4	-0.602	-2.134	0	13.297	-13.297	0	0
584		5	-0.618	-4.269	0	0	0	0	0
585	9	1	-0.503	0	0	0	0	0	0
586		2	-0.519	0	0	0	0	0	0
587		3	-0.535	0	0	0	0	0	0
588		4	-0.551	0	0	0	0	0	0
589		5	-0.567	0	0	0	0	0	0
590	9	1	-0.707	0.03	0	0	0	0	0
591		2	-0.716	0.009	0	0.211	-0.211	0	0
592		3	-0.724	-0.011	0	0.205	-0.205	0	0
593		4	-0.733	-0.031	0	-0.018	0.018	0	0
594		5	-0.741	-0.051	0	-0.459	0.459	0	0
595	9	1	2.649	-0.026	0	0	0	0	0
596		2	2.658	-0.007	0	-0.173	0.173	0	0
597		3	2.666	0.011	0	-0.154	0.154	0	0
598		4	2.675	0.029	0	0.056	-0.056	0	0
599		5	2.683	0.048	0	0.457	-0.457	0	0
600	9	1	-0.781	0.051	0	-0.459	0.459	0	0
601		2	-0.789	0.031	0	-0.018	0.018	0	0
602		3	-0.798	0.011	0	0.205	-0.205	0	0
603		4	-0.807	-0.009	0	0.211	-0.211	0	0
604		5	-0.815	-0.03	0	0	0	0	0
605	9	1	2.716	-0.048	0	0.457	-0.457	0	0
606		2	2.725	-0.029	0	0.056	-0.056	0	0
607		3	2.734	-0.011	0	-0.154	0.154	0	0
608		4	2.742	0.007	0	-0.173	0.173	0	0
609		5	2.751	0.026	0	0	0	0	0
610	9	1	1.62	-0.04	0	0	0	0	0
611		2	1.629	-0.02	0	-0.326	0.326	0	0
612		3	1.638	0	0	-0.435	0.435	0	0
613		4	1.646	0.02	0	-0.326	0.326	0	0
614		5	1.655	0.04	0	0	0	0	0
615	9	1	1.704	-0.04	0	0	0	0	0
616		2	1.712	-0.02	0	-0.326	0.326	0	0
617		3	1.721	0	0	-0.435	0.435	0	0
618		4	1.729	0.02	0	-0.326	0.326	0	0
619		5	1.738	0.04	0	0	0	0	0
620	9	1	-1.602	0.037	0	0	0	0	0
621		2	-1.611	0.018	0	0.287	-0.287	0	0
622		3	-1.62	0	0	0.383	-0.383	0	0
623		4	-1.628	-0.018	0	0.287	-0.287	0	0
624		5	-1.637	-0.037	0	0	0	0	0
625	9	1	-1.679	0.037	0	0	0	0	0
626		2	-1.688	0.018	0	0.287	-0.287	0	0
627		3	-1.696	0	0	0.383	-0.383	0	0
628		4	-1.705	-0.018	0	0.287	-0.287	0	0
629		5	-1.714	-0.037	0	0	0	0	0
630	10	1	-0.286	-0.054	0	0	0	0	0
631		2	-0.286	-0.017	0	-0.317	0.317	0	0
632		3	-0.286	0.019	0	-0.311	0.311	0	0
633		4	-0.286	0.055	0	0.016	-0.016	0	0
634		5	-0.286	0.091	0	0.665	-0.665	0	0
635	10	1	0.238	-0.096	0	0.665	-0.665	0	0
636		2	0.238	-0.056	0	-0.072	0.072	0	0
637		3	0.238	-0.017	0	-0.429	0.429	0	0
638		4	0.238	0.022	0	-0.405	0.405	0	0
639		5	0.238	0.061	0	0	0	0	0
640	10	1	1.407	-0.053	0	0	0	0	0
641		2	1.407	-0.017	0	-0.314	0.314	0	0
642		3	1.407	0.019	0	-0.307	0.307	0	0
643		4	1.407	0.055	0	0.023	-0.023	0	0

Member Section Stresses (Continued)

LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
644		5	1.407	0.091	0	0.674	-0.674	0	0
645	10	1	0.823	-0.096	0	0.674	-0.674	0	0
646		2	0.823	-0.057	0	-0.066	0.066	0	0
647		3	0.823	-0.017	0	-0.424	0.424	0	0
648		4	0.823	0.022	0	-0.403	0.403	0	0
649		5	0.823	0.061	0	0	0	0	0
650	10	1	0.297	1.829	0	0	0	0	0
651		2	0.281	0.915	0	5.699	-5.699	0	0
652		3	0.265	0	0	7.598	-7.598	0	0
653		4	0.249	-0.915	0	5.699	-5.699	0	0
654		5	0.233	-1.829	0	0	0	0	0
655	10	1	0.01	0	0	0	0	0	0
656		2	-0.006	0	0	0	0	0	0
657		3	-0.022	0	0	0	0	0	0
658		4	-0.038	0	0	0	0	0	0
659		5	-0.054	0	0	0	0	0	0
660	10	1	1.144	0.031	0	0	0	0	0
661		2	1.136	0.011	0	0.224	-0.224	0	0
662		3	1.127	-0.009	0	0.231	-0.231	0	0
663		4	1.118	-0.029	0	0.02	-0.02	0	0
664		5	1.11	-0.049	0	-0.408	0.408	0	0
665	10	1	-0.572	-0.029	0	0	0	0	0
666		2	-0.564	-0.01	0	-0.204	0.204	0	0
667		3	-0.555	0.008	0	-0.216	0.216	0	0
668		4	-0.546	0.026	0	-0.037	0.037	0	0
669		5	-0.538	0.045	0	0.333	-0.333	0	0
670	10	1	1.07	0.049	0	-0.408	0.408	0	0
671		2	1.062	0.029	0	0.02	-0.02	0	0
672		3	1.053	0.009	0	0.231	-0.231	0	0
673		4	1.045	-0.011	0	0.224	-0.224	0	0
674		5	1.036	-0.031	0	0	0	0	0
675	10	1	-0.505	-0.045	0	0.333	-0.333	0	0
676		2	-0.496	-0.026	0	-0.037	0.037	0	0
677		3	-0.488	-0.008	0	-0.216	0.216	0	0
678		4	-0.479	0.01	0	-0.204	0.204	0	0
679		5	-0.47	0.029	0	0	0	0	0
680	10	1	-0.471	-0.04	0	0	0	0	0
681		2	-0.462	-0.02	0	-0.326	0.326	0	0
682		3	-0.454	0	0	-0.435	0.435	0	0
683		4	-0.445	0.02	0	-0.326	0.326	0	0
684		5	-0.437	0.04	0	0	0	0	0
685	10	1	-0.389	-0.04	0	0	0	0	0
686		2	-0.38	-0.02	0	-0.326	0.326	0	0
687		3	-0.372	0	0	-0.435	0.435	0	0
688		4	-0.363	0.02	0	-0.326	0.326	0	0
689		5	-0.355	0.04	0	0	0	0	0
690	10	1	1.113	0.037	0	0	0	0	0
691		2	1.104	0.018	0	0.287	-0.287	0	0
692		3	1.096	0	0	0.383	-0.383	0	0
693		4	1.087	-0.018	0	0.287	-0.287	0	0
694		5	1.078	-0.037	0	0	0	0	0
695	10	1	1.038	0.037	0	0	0	0	0
696		2	1.03	0.018	0	0.287	-0.287	0	0
697		3	1.021	0	0	0.383	-0.383	0	0
698		4	1.012	-0.018	0	0.287	-0.287	0	0
699		5	1.004	-0.037	0	0	0	0	0
700	11	1	2.238	-0.052	0	0	0	0	0
701		2	2.238	-0.016	0	-0.307	0.307	0	0
702		3	2.238	0.02	0	-0.292	0.292	0	0
703		4	2.238	0.056	0	0.046	-0.046	0	0
704		5	2.238	0.092	0	0.705	-0.705	0	0
705	11	1	1.038	-0.097	0	0.705	-0.705	0	0
706		2	1.038	-0.057	0	-0.042	0.042	0	0
707		3	1.038	-0.018	0	-0.409	0.409	0	0
708		4	1.038	0.021	0	-0.395	0.395	0	0
709		5	1.038	0.06	0	0	0	0	0
710	11	1	-1.072	-0.052	0	0	0	0	0
711		2	-1.072	-0.016	0	-0.305	0.305	0	0

Member Section Stresses (Continued)

LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
712		3	-1.072	0.02	0	-0.289	0.289	0	0
713		4	-1.072	0.056	0	0.05	-0.05	0	0
714		5	-1.072	0.092	0	0.711	-0.711	0	0
715	11	M5	1	0.17	-0.097	0	0.711	-0.711	0
716		2	0.17	-0.058	0	-0.038	0.038	0	0
717		3	0.17	-0.018	0	-0.406	0.406	0	0
718		4	0.17	0.021	0	-0.393	0.393	0	0
719		5	0.17	0.06	0	0	0	0	0
720	11	M6	1	-0.424	1.829	0	0	0	0
721		2	-0.44	0.915	0	5.699	-5.699	0	0
722		3	-0.456	0	0	7.598	-7.598	0	0
723		4	-0.472	-0.915	0	5.699	-5.699	0	0
724		5	-0.488	-1.829	0	0	0	0	0
725	11	M10	1	-0.283	0	0	0	0	0
726		2	-0.299	0	0	0	0	0	0
727		3	-0.315	0	0	0	0	0	0
728		4	-0.331	0	0	0	0	0	0
729		5	-0.347	0	0	0	0	0	0
730	11	M7	1	-1.025	0.029	0	0	0	0
731		2	-1.034	0.009	0	0.211	-0.211	0	0
732		3	-1.042	-0.011	0	0.204	-0.204	0	0
733		4	-1.051	-0.031	0	-0.02	0.02	0	0
734		5	-1.06	-0.051	0	-0.461	0.461	0	0
735	11	M8	1	2.332	-0.026	0	0	0	0
736		2	2.34	-0.007	0	-0.171	0.171	0	0
737		3	2.349	0.011	0	-0.151	0.151	0	0
738		4	2.358	0.03	0	0.061	-0.061	0	0
739		5	2.366	0.048	0	0.464	-0.464	0	0
740	11	M9	1	-1.099	0.051	0	-0.461	0.461	0
741		2	-1.108	0.031	0	-0.02	0.02	0	0
742		3	-1.116	0.011	0	0.204	-0.204	0	0
743		4	-1.125	-0.009	0	0.211	-0.211	0	0
744		5	-1.134	-0.029	0	0	0	0	0
745	11	M11	1	2.399	-0.048	0	0.464	-0.464	0
746		2	2.408	-0.03	0	0.061	-0.061	0	0
747		3	2.416	-0.011	0	-0.151	0.151	0	0
748		4	2.425	0.007	0	-0.171	0.171	0	0
749		5	2.434	0.026	0	0	0	0	0
750	11	M12	1	1.3	-0.04	0	0	0	0
751		2	1.309	-0.02	0	-0.326	0.326	0	0
752		3	1.317	0	0	-0.435	0.435	0	0
753		4	1.326	0.02	0	-0.326	0.326	0	0
754		5	1.335	0.04	0	0	0	0	0
755	11	M13	1	1.383	-0.04	0	0	0	0
756		2	1.392	-0.02	0	-0.326	0.326	0	0
757		3	1.401	0	0	-0.435	0.435	0	0
758		4	1.409	0.02	0	-0.326	0.326	0	0
759		5	1.418	0.04	0	0	0	0	0
760	11	M14	1	-1.918	0.037	0	0	0	0
761		2	-1.926	0.018	0	0.287	-0.287	0	0
762		3	-1.935	0	0	0.383	-0.383	0	0
763		4	-1.943	-0.018	0	0.287	-0.287	0	0
764		5	-1.952	-0.037	0	0	0	0	0
765	11	M15	1	-1.995	0.037	0	0	0	0
766		2	-2.003	0.018	0	0.287	-0.287	0	0
767		3	-2.012	0	0	0.383	-0.383	0	0
768		4	-2.021	-0.018	0	0.287	-0.287	0	0
769		5	-2.029	-0.037	0	0	0	0	0
770	12	M1	1	-1.148	-0.054	0	0	0	0
771		2	-1.148	-0.018	0	-0.322	0.322	0	0
772		3	-1.148	0.018	0	-0.323	0.323	0	0
773		4	-1.148	0.054	0	-0.001	0.001	0	0
774		5	-1.148	0.09	0	0.643	-0.643	0	0
775	12	M2	1	0.076	-0.095	0	0.643	-0.643	0
776		2	0.076	-0.056	0	-0.089	0.089	0	0
777		3	0.076	-0.017	0	-0.44	0.44	0	0
778		4	0.076	0.023	0	-0.41	0.41	0	0
779		5	0.076	0.062	0	0	0	0	0

Member Section Stresses (Continued)

LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
780	12	M4	1	3.048	-0.054	0	0	0	0
781			2	3.048	-0.018	0	-0.319	0.319	0
782			3	3.048	0.018	0	-0.315	0.315	0
783			4	3.048	0.054	0	0.011	-0.011	0
784			5	3.048	0.091	0	0.658	-0.658	0
785	12	M5	1	1.387	-0.095	0	0.658	-0.658	0
786			2	1.387	-0.056	0	-0.078	0.078	0
787			3	1.387	-0.017	0	-0.433	0.433	0
788			4	1.387	0.022	0	-0.407	0.407	0
789			5	1.387	0.061	0	0	0	0
790	12	M6	1	0.619	2.592	0	0	0	0
791			2	0.603	1.296	0	8.073	-8.073	0
792			3	0.587	0	0	10.764	-10.764	0
793			4	0.571	-1.296	0	8.073	-8.073	0
794			5	0.555	-2.592	0	0	0	0
795	12	M10	1	0.063	0.418	0	0	0	0
796			2	0.047	0.209	0	1.226	-1.226	0
797			3	0.031	0	0	1.634	-1.634	0
798			4	0.015	-0.209	0	1.226	-1.226	0
799			5	-0.001	-0.418	0	0	0	0
800	12	M7	1	2.325	0.031	0	0	0	0
801			2	2.316	0.011	0	0.231	-0.231	0
802			3	2.307	-0.009	0	0.245	-0.245	0
803			4	2.299	-0.029	0	0.041	-0.041	0
804			5	2.29	-0.049	0	-0.38	0.38	0
805	12	M8	1	-1.853	-0.03	0	0	0	0
806			2	-1.845	-0.012	0	-0.221	0.221	0
807			3	-1.836	0.006	0	-0.25	0.25	0
808			4	-1.827	0.025	0	-0.088	0.088	0
809			5	-1.819	0.043	0	0.265	-0.265	0
810	12	M9	1	2.251	0.049	0	-0.38	0.38	0
811			2	2.242	0.029	0	0.041	-0.041	0
812			3	2.234	0.009	0	0.245	-0.245	0
813			4	2.225	-0.011	0	0.231	-0.231	0
814			5	2.216	-0.031	0	0	0	0
815	12	M11	1	-1.785	-0.043	0	0.265	-0.265	0
816			2	-1.776	-0.025	0	-0.088	0.088	0
817			3	-1.768	-0.006	0	-0.25	0.25	0
818			4	-1.759	0.012	0	-0.221	0.221	0
819			5	-1.751	0.03	0	0	0	0
820	12	M12	1	-1.262	-0.04	0	0	0	0
821			2	-1.253	-0.02	0	-0.326	0.326	0
822			3	-1.245	0	0	-0.435	0.435	0
823			4	-1.236	0.02	0	-0.326	0.326	0
824			5	-1.227	0.04	0	0	0	0
825	12	M13	1	-1.18	-0.04	0	0	0	0
826			2	-1.172	-0.02	0	-0.326	0.326	0
827			3	-1.163	0	0	-0.435	0.435	0
828			4	-1.154	0.02	0	-0.326	0.326	0
829			5	-1.146	0.04	0	0	0	0
830	12	M14	1	2.8	0.037	0	0	0	0
831			2	2.791	0.018	0	0.287	-0.287	0
832			3	2.783	0	0	0.383	-0.383	0
833			4	2.774	-0.018	0	0.287	-0.287	0
834			5	2.766	-0.037	0	0	0	0
835	12	M15	1	2.727	0.037	0	0	0	0
836			2	2.719	0.018	0	0.287	-0.287	0
837			3	2.71	0	0	0.383	-0.383	0
838			4	2.702	-0.018	0	0.287	-0.287	0
839			5	2.693	-0.037	0	0	0	0
840	13	M1	1	3.9	-0.052	0	0	0	0
841			2	3.9	-0.016	0	-0.302	0.302	0
842			3	3.9	0.02	0	-0.283	0.283	0
843			4	3.9	0.056	0	0.059	-0.059	0
844			5	3.9	0.092	0	0.723	-0.723	0
845	13	M2	1	1.675	-0.097	0	0.723	-0.723	0
846			2	1.675	-0.058	0	-0.029	0.029	0
847			3	1.675	-0.019	0	-0.4	0.4	0

Member Section Stresses (Continued)

LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
848		4	1.675	0.021	0	-0.39	0.39	0	0
849		5	1.675	0.06	0	0	0	0	0
850	13	1	-1.912	-0.052	0	0	0	0	0
851		2	-1.912	-0.016	0	-0.3	0.3	0	0
852		3	-1.912	0.02	0	-0.278	0.278	0	0
853		4	-1.912	0.057	0	0.066	-0.066	0	0
854		5	-1.912	0.093	0	0.732	-0.732	0	0
855	13	1	0.081	-0.097	0	0.732	-0.732	0	0
856		2	0.081	-0.058	0	-0.023	0.023	0	0
857		3	0.081	-0.019	0	-0.396	0.396	0	0
858		4	0.081	0.02	0	-0.388	0.388	0	0
859		5	0.081	0.06	0	0	0	0	0
860	13	1	-0.823	2.592	0	0	0	0	0
861		2	-0.839	1.296	0	8.073	-8.073	0	0
862		3	-0.855	0	0	10.764	-10.764	0	0
863		4	-0.871	-1.296	0	8.073	-8.073	0	0
864		5	-0.887	-2.592	0	0	0	0	0
865	13	1	-0.522	0.418	0	0	0	0	0
866		2	-0.538	0.209	0	1.226	-1.226	0	0
867		3	-0.554	0	0	1.634	-1.634	0	0
868		4	-0.57	-0.209	0	1.226	-1.226	0	0
869		5	-0.586	-0.418	0	0	0	0	0
870	13	1	-2.015	0.029	0	0	0	0	0
871		2	-2.024	0.009	0	0.204	-0.204	0	0
872		3	-2.033	-0.011	0	0.192	-0.192	0	0
873		4	-2.041	-0.031	0	-0.039	0.039	0	0
874		5	-2.05	-0.051	0	-0.486	0.486	0	0
875	13	1	3.956	-0.024	0	0	0	0	0
876		2	3.965	-0.006	0	-0.156	0.156	0	0
877		3	3.973	0.013	0	-0.12	0.12	0	0
878		4	3.982	0.031	0	0.108	-0.108	0	0
879		5	3.991	0.05	0	0.526	-0.526	0	0
880	13	1	-2.089	0.051	0	-0.486	0.486	0	0
881		2	-2.098	0.031	0	-0.039	0.039	0	0
882		3	-2.106	0.011	0	0.192	-0.192	0	0
883		4	-2.115	-0.009	0	0.204	-0.204	0	0
884		5	-2.124	-0.029	0	0	0	0	0
885	13	1	4.025	-0.05	0	0.526	-0.526	0	0
886		2	4.033	-0.031	0	0.108	-0.108	0	0
887		3	4.042	-0.013	0	-0.12	0.12	0	0
888		4	4.05	0.006	0	-0.156	0.156	0	0
889		5	4.059	0.024	0	0	0	0	0
890	13	1	2.282	-0.04	0	0	0	0	0
891		2	2.29	-0.02	0	-0.326	0.326	0	0
892		3	2.299	0	0	-0.435	0.435	0	0
893		4	2.307	0.02	0	-0.326	0.326	0	0
894		5	2.316	0.04	0	0	0	0	0
895	13	1	2.365	-0.04	0	0	0	0	0
896		2	2.374	-0.02	0	-0.326	0.326	0	0
897		3	2.383	0	0	-0.435	0.435	0	0
898		4	2.391	0.02	0	-0.326	0.326	0	0
899		5	2.4	0.04	0	0	0	0	0
900	13	1	-3.262	0.037	0	0	0	0	0
901		2	-3.271	0.018	0	0.287	-0.287	0	0
902		3	-3.279	0	0	0.383	-0.383	0	0
903		4	-3.288	-0.018	0	0.287	-0.287	0	0
904		5	-3.297	-0.037	0	0	0	0	0
905	13	1	-3.34	0.037	0	0	0	0	0
906		2	-3.348	0.018	0	0.287	-0.287	0	0
907		3	-3.357	0	0	0.383	-0.383	0	0
908		4	-3.365	-0.018	0	0.287	-0.287	0	0
909		5	-3.374	-0.037	0	0	0	0	0
910	14	1	-1.386	-0.054	0	0	0	0	0
911		2	-1.386	-0.018	0	-0.322	0.322	0	0
912		3	-1.386	0.018	0	-0.322	0.322	0	0
913		4	-1.386	0.054	0	0	0	0	0
914		5	-1.386	0.09	0	0.644	-0.644	0	0
915	14	1	-0.16	-0.095	0	0.644	-0.644	0	0

Member Section Stresses (Continued)

	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
916			2	-0.16	-0.056	0	-0.088	0.088	0	0
917			3	-0.16	-0.017	0	-0.439	0.439	0	0
918			4	-0.16	0.023	0	-0.41	0.41	0	0
919			5	-0.16	0.062	0	0	0	0	0
920	14	M4	1	2.809	-0.054	0	0	0	0	0
921			2	2.809	-0.018	0	-0.319	0.319	0	0
922			3	2.809	0.018	0	-0.316	0.316	0	0
923			4	2.809	0.054	0	0.009	-0.009	0	0
924			5	2.809	0.091	0	0.657	-0.657	0	0
925	14	M5	1	1.151	-0.095	0	0.657	-0.657	0	0
926			2	1.151	-0.056	0	-0.079	0.079	0	0
927			3	1.151	-0.017	0	-0.433	0.433	0	0
928			4	1.151	0.022	0	-0.407	0.407	0	0
929			5	1.151	0.062	0	0	0	0	0
930	14	M6	1	0.659	1.829	0	0	0	0	0
931			2	0.643	0.915	0	5.699	-5.699	0	0
932			3	0.627	0	0	7.598	-7.598	0	0
933			4	0.611	-0.915	0	5.699	-5.699	0	0
934			5	0.595	-1.829	0	0	0	0	0
935	14	M10	1	0.132	0.418	0	0	0	0	0
936			2	0.116	0.209	0	1.226	-1.226	0	0
937			3	0.1	0	0	1.634	-1.634	0	0
938			4	0.084	-0.209	0	1.226	-1.226	0	0
939			5	0.068	-0.418	0	0	0	0	0
940	14	M7	1	2.224	0.031	0	0	0	0	0
941			2	2.216	0.011	0	0.231	-0.231	0	0
942			3	2.207	-0.009	0	0.244	-0.244	0	0
943			4	2.199	-0.029	0	0.04	-0.04	0	0
944			5	2.19	-0.049	0	-0.381	0.381	0	0
945	14	M8	1	-1.952	-0.03	0	0	0	0	0
946			2	-1.943	-0.012	0	-0.22	0.22	0	0
947			3	-1.934	0.006	0	-0.249	0.249	0	0
948			4	-1.926	0.025	0	-0.087	0.087	0	0
949			5	-1.917	0.043	0	0.267	-0.267	0	0
950	14	M9	1	2.151	0.049	0	-0.381	0.381	0	0
951			2	2.142	0.029	0	0.04	-0.04	0	0
952			3	2.133	0.009	0	0.244	-0.244	0	0
953			4	2.125	-0.011	0	0.231	-0.231	0	0
954			5	2.116	-0.031	0	0	0	0	0
955	14	M11	1	-1.884	-0.043	0	0.267	-0.267	0	0
956			2	-1.875	-0.025	0	-0.087	0.087	0	0
957			3	-1.866	-0.006	0	-0.249	0.249	0	0
958			4	-1.858	0.012	0	-0.22	0.22	0	0
959			5	-1.849	0.03	0	0	0	0	0
960	14	M12	1	-1.361	-0.04	0	0	0	0	0
961			2	-1.353	-0.02	0	-0.326	0.326	0	0
962			3	-1.344	0	0	-0.435	0.435	0	0
963			4	-1.335	0.02	0	-0.326	0.326	0	0
964			5	-1.327	0.04	0	0	0	0	0
965	14	M13	1	-1.279	-0.04	0	0	0	0	0
966			2	-1.271	-0.02	0	-0.326	0.326	0	0
967			3	-1.262	0	0	-0.435	0.435	0	0
968			4	-1.254	0.02	0	-0.326	0.326	0	0
969			5	-1.245	0.04	0	0	0	0	0
970	14	M14	1	2.701	0.037	0	0	0	0	0
971			2	2.692	0.018	0	0.287	-0.287	0	0
972			3	2.684	0	0	0.383	-0.383	0	0
973			4	2.675	-0.018	0	0.287	-0.287	0	0
974			5	2.666	-0.037	0	0	0	0	0
975	14	M15	1	2.628	0.037	0	0	0	0	0
976			2	2.62	0.018	0	0.287	-0.287	0	0
977			3	2.611	0	0	0.383	-0.383	0	0
978			4	2.602	-0.018	0	0.287	-0.287	0	0
979			5	2.594	-0.037	0	0	0	0	0
980	15	M1	1	3.662	-0.052	0	0	0	0	0
981			2	3.662	-0.016	0	-0.302	0.302	0	0
982			3	3.662	0.02	0	-0.282	0.282	0	0
983			4	3.662	0.056	0	0.06	-0.06	0	0

Member Section Stresses (Continued)

LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
984		5	3.662	0.092	0	0.724	-0.724	0	0
985	15	1	1.438	-0.097	0	0.724	-0.724	0	0
986		2	1.438	-0.058	0	-0.028	0.028	0	0
987		3	1.438	-0.019	0	-0.399	0.399	0	0
988		4	1.438	0.021	0	-0.39	0.39	0	0
989		5	1.438	0.06	0	0	0	0	0
990	15	1	-2.149	-0.052	0	0	0	0	0
991		2	-2.149	-0.016	0	-0.301	0.301	0	0
992		3	-2.149	0.02	0	-0.279	0.279	0	0
993		4	-2.149	0.057	0	0.064	-0.064	0	0
994		5	-2.149	0.093	0	0.73	-0.73	0	0
995	15	1	-0.155	-0.097	0	0.73	-0.73	0	0
996		2	-0.155	-0.058	0	-0.024	0.024	0	0
997		3	-0.155	-0.019	0	-0.397	0.397	0	0
998		4	-0.155	0.02	0	-0.389	0.389	0	0
999		5	-0.155	0.06	0	0	0	0	0
1000	15	1	-0.783	1.829	0	0	0	0	0
1001		2	-0.799	0.915	0	5.699	-5.699	0	0
1002		3	-0.815	0	0	7.598	-7.598	0	0
1003		4	-0.831	-0.915	0	5.699	-5.699	0	0
1004		5	-0.847	-1.829	0	0	0	0	0
1005	15	1	-0.453	0.418	0	0	0	0	0
1006		2	-0.469	0.209	0	1.226	-1.226	0	0
1007		3	-0.485	0	0	1.634	-1.634	0	0
1008		4	-0.501	-0.209	0	1.226	-1.226	0	0
1009		5	-0.517	-0.418	0	0	0	0	0
1010	15	1	-2.115	0.029	0	0	0	0	0
1011		2	-2.123	0.009	0	0.204	-0.204	0	0
1012		3	-2.132	-0.011	0	0.191	-0.191	0	0
1013		4	-2.14	-0.031	0	-0.039	0.039	0	0
1014		5	-2.149	-0.051	0	-0.487	0.487	0	0
1015	15	1	3.857	-0.024	0	0	0	0	0
1016		2	3.865	-0.006	0	-0.155	0.155	0	0
1017		3	3.874	0.013	0	-0.119	0.119	0	0
1018		4	3.883	0.031	0	0.109	-0.109	0	0
1019		5	3.891	0.05	0	0.528	-0.528	0	0
1020	15	1	-2.188	0.051	0	-0.487	0.487	0	0
1021		2	-2.197	0.031	0	-0.039	0.039	0	0
1022		3	-2.206	0.011	0	0.191	-0.191	0	0
1023		4	-2.214	-0.009	0	0.204	-0.204	0	0
1024		5	-2.223	-0.029	0	0	0	0	0
1025	15	1	3.925	-0.05	0	0.528	-0.528	0	0
1026		2	3.934	-0.031	0	0.109	-0.109	0	0
1027		3	3.942	-0.013	0	-0.119	0.119	0	0
1028		4	3.951	0.006	0	-0.155	0.155	0	0
1029		5	3.96	0.024	0	0	0	0	0
1030	15	1	2.181	-0.04	0	0	0	0	0
1031		2	2.19	-0.02	0	-0.326	0.326	0	0
1032		3	2.198	0	0	-0.435	0.435	0	0
1033		4	2.207	0.02	0	-0.326	0.326	0	0
1034		5	2.216	0.04	0	0	0	0	0
1035	15	1	2.265	-0.04	0	0	0	0	0
1036		2	2.274	-0.02	0	-0.326	0.326	0	0
1037		3	2.282	0	0	-0.435	0.435	0	0
1038		4	2.291	0.02	0	-0.326	0.326	0	0
1039		5	2.299	0.04	0	0	0	0	0
1040	15	1	-3.36	0.037	0	0	0	0	0
1041		2	-3.369	0.018	0	0.287	-0.287	0	0
1042		3	-3.378	0	0	0.383	-0.383	0	0
1043		4	-3.386	-0.018	0	0.287	-0.287	0	0
1044		5	-3.395	-0.037	0	0	0	0	0
1045	15	1	-3.438	0.037	0	0	0	0	0
1046		2	-3.447	0.018	0	0.287	-0.287	0	0
1047		3	-3.455	0	0	0.383	-0.383	0	0
1048		4	-3.464	-0.018	0	0.287	-0.287	0	0
1049		5	-3.472	-0.037	0	0	0	0	0
1050	16	1	-1.792	-0.041	0	0	0	0	0
1051		2	-1.792	-0.014	0	-0.244	0.244	0	0

Member Section Stresses (Continued)

	LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
1052			3	-1.792	0.013	0	-0.246	0.246	0	0
1053			4	-1.792	0.04	0	-0.007	0.007	0	0
1054			5	-1.792	0.067	0	0.474	-0.474	0	0
1055	16	M2	1	-0.321	-0.071	0	0.474	-0.474	0	0
1056			2	-0.321	-0.042	0	-0.073	0.073	0	0
1057			3	-0.321	-0.012	0	-0.334	0.334	0	0
1058			4	-0.321	0.017	0	-0.31	0.31	0	0
1059			5	-0.321	0.047	0	0	0	0	0
1060	16	M4	1	2.604	-0.041	0	0	0	0	0
1061			2	2.604	-0.014	0	-0.242	0.242	0	0
1062			3	2.604	0.014	0	-0.242	0.242	0	0
1063			4	2.604	0.041	0	0	0	0	0
1064			5	2.604	0.068	0	0.483	-0.483	0	0
1065	16	M5	1	1.025	-0.071	0	0.483	-0.483	0	0
1066			2	1.025	-0.042	0	-0.066	0.066	0	0
1067			3	1.025	-0.012	0	-0.33	0.33	0	0
1068			4	1.025	0.017	0	-0.308	0.308	0	0
1069			5	1.025	0.046	0	0	0	0	0
1070	16	M6	1	0.673	1.372	0	0	0	0	0
1071			2	0.661	0.686	0	4.274	-4.274	0	0
1072			3	0.649	0	0	5.699	-5.699	0	0
1073			4	0.637	-0.686	0	4.274	-4.274	0	0
1074			5	0.625	-1.372	0	0	0	0	0
1075	16	M10	1	0.191	0	0	0	0	0	0
1076			2	0.179	0	0	0	0	0	0
1077			3	0.167	0	0	0	0	0	0
1078			4	0.155	0	0	0	0	0	0
1079			5	0.143	0	0	0	0	0	0
1080	16	M7	1	2.214	0.024	0	0	0	0	0
1081			2	2.207	0.009	0	0.176	-0.176	0	0
1082			3	2.201	-0.006	0	0.19	-0.19	0	0
1083			4	2.194	-0.021	0	0.04	-0.04	0	0
1084			5	2.188	-0.036	0	-0.273	0.273	0	0
1085	16	M8	1	-2.244	-0.024	0	0	0	0	0
1086			2	-2.238	-0.01	0	-0.173	0.173	0	0
1087			3	-2.232	0.004	0	-0.203	0.203	0	0
1088			4	-2.225	0.018	0	-0.089	0.089	0	0
1089			5	-2.219	0.032	0	0.168	-0.168	0	0
1090	16	M9	1	2.158	0.036	0	-0.273	0.273	0	0
1091			2	2.152	0.021	0	0.04	-0.04	0	0
1092			3	2.146	0.006	0	0.19	-0.19	0	0
1093			4	2.139	-0.009	0	0.176	-0.176	0	0
1094			5	2.133	-0.024	0	0	0	0	0
1095	16	M11	1	-2.193	-0.032	0	0.168	-0.168	0	0
1096			2	-2.187	-0.018	0	-0.089	0.089	0	0
1097			3	-2.18	-0.004	0	-0.203	0.203	0	0
1098			4	-2.174	0.01	0	-0.173	0.173	0	0
1099			5	-2.167	0.024	0	0	0	0	0
1100	16	M12	1	-1.46	-0.03	0	0	0	0	0
1101			2	-1.454	-0.015	0	-0.245	0.245	0	0
1102			3	-1.447	0	0	-0.326	0.326	0	0
1103			4	-1.441	0.015	0	-0.245	0.245	0	0
1104			5	-1.434	0.03	0	0	0	0	0
1105	16	M13	1	-1.399	-0.03	0	0	0	0	0
1106			2	-1.393	-0.015	0	-0.245	0.245	0	0
1107			3	-1.386	0	0	-0.326	0.326	0	0
1108			4	-1.38	0.015	0	-0.245	0.245	0	0
1109			5	-1.373	0.03	0	0	0	0	0
1110	16	M14	1	2.728	0.028	0	0	0	0	0
1111			2	2.721	0.014	0	0.215	-0.215	0	0
1112			3	2.715	0	0	0.287	-0.287	0	0
1113			4	2.708	-0.014	0	0.215	-0.215	0	0
1114			5	2.702	-0.028	0	0	0	0	0
1115	16	M15	1	2.674	0.028	0	0	0	0	0
1116			2	2.668	0.014	0	0.215	-0.215	0	0
1117			3	2.661	0	0	0.287	-0.287	0	0
1118			4	2.655	-0.014	0	0.215	-0.215	0	0
1119			5	2.648	-0.028	0	0	0	0	0

Member Section Stresses (Continued)

LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
1120	17	M1	1	3.255	-0.039	0	0	0	0
1121			2	3.255	-0.012	0	-0.224	0.224	0
1122			3	3.255	0.016	0	-0.206	0.206	0
1123			4	3.255	0.043	0	0.053	-0.053	0
1124			5	3.255	0.07	0	0.554	-0.554	0
1125	17	M2	1	1.277	-0.073	0	0.554	-0.554	0
1126			2	1.277	-0.044	0	-0.013	0.013	0
1127			3	1.277	-0.014	0	-0.294	0.294	0
1128			4	1.277	0.015	0	-0.29	0.29	0
1129			5	1.277	0.045	0	0	0	0
1130	17	M4	1	-2.353	-0.039	0	0	0	0
1131			2	-2.353	-0.011	0	-0.223	0.223	0
1132			3	-2.353	0.016	0	-0.205	0.205	0
1133			4	-2.353	0.043	0	0.055	-0.055	0
1134			5	-2.353	0.07	0	0.556	-0.556	0
1135	17	M5	1	-0.28	-0.073	0	0.556	-0.556	0
1136			2	-0.28	-0.044	0	-0.011	0.011	0
1137			3	-0.28	-0.014	0	-0.293	0.293	0
1138			4	-0.28	0.015	0	-0.289	0.289	0
1139			5	-0.28	0.045	0	0	0	0
1140	17	M6	1	-0.769	1.372	0	0	0	0
1141			2	-0.781	0.686	0	4.274	-4.274	0
1142			3	-0.793	0	0	5.699	-5.699	0
1143			4	-0.805	-0.686	0	4.274	-4.274	0
1144			5	-0.817	-1.372	0	0	0	0
1145	17	M10	1	-0.395	0	0	0	0	0
1146			2	-0.407	0	0	0	0	0
1147			3	-0.419	0	0	0	0	0
1148			4	-0.431	0	0	0	0	0
1149			5	-0.443	0	0	0	0	0
1150	17	M7	1	-2.125	0.021	0	0	0	0
1151			2	-2.131	0.006	0	0.15	-0.15	0
1152			3	-2.138	-0.009	0	0.137	-0.137	0
1153			4	-2.144	-0.024	0	-0.04	0.04	0
1154			5	-2.15	-0.039	0	-0.379	0.379	0
1155	17	M8	1	3.563	-0.017	0	0	0	0
1156			2	3.569	-0.003	0	-0.108	0.108	0
1157			3	3.576	0.01	0	-0.073	0.073	0
1158			4	3.582	0.024	0	0.107	-0.107	0
1159			5	3.589	0.038	0	0.429	-0.429	0
1160	17	M9	1	-2.18	0.039	0	-0.379	0.379	0
1161			2	-2.187	0.024	0	-0.04	0.04	0
1162			3	-2.193	0.009	0	0.137	-0.137	0
1163			4	-2.199	-0.006	0	0.15	-0.15	0
1164			5	-2.206	-0.021	0	0	0	0
1165	17	M11	1	3.615	-0.038	0	0.429	-0.429	0
1166			2	3.621	-0.024	0	0.107	-0.107	0
1167			3	3.628	-0.01	0	-0.073	0.073	0
1168			4	3.634	0.003	0	-0.108	0.108	0
1169			5	3.64	0.017	0	0	0	0
1170	17	M12	1	2.082	-0.03	0	0	0	0
1171			2	2.088	-0.015	0	-0.245	0.245	0
1172			3	2.095	0	0	-0.326	0.326	0
1173			4	2.101	0.015	0	-0.245	0.245	0
1174			5	2.107	0.03	0	0	0	0
1175	17	M13	1	2.145	-0.03	0	0	0	0
1176			2	2.151	-0.015	0	-0.245	0.245	0
1177			3	2.158	0	0	-0.326	0.326	0
1178			4	2.164	0.015	0	-0.245	0.245	0
1179			5	2.171	0.03	0	0	0	0
1180	17	M14	1	-3.332	0.028	0	0	0	0
1181			2	-3.339	0.014	0	0.215	-0.215	0
1182			3	-3.345	0	0	0.287	-0.287	0
1183			4	-3.352	-0.014	0	0.215	-0.215	0
1184			5	-3.358	-0.028	0	0	0	0
1185	17	M15	1	-3.391	0.028	0	0	0	0
1186			2	-3.398	0.014	0	0.215	-0.215	0
1187			3	-3.404	0	0	0.287	-0.287	0

Member Section Stresses (Continued)

LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
1188		4	-3.41	-0.014	0	0.215	-0.215	0	0
1189		5	-3.417	-0.028	0	0	0	0	0
1190	18	1	0.813	-0.044	0	0	0	0	0
1191		2	0.813	-0.014	0	-0.26	0.26	0	0
1192		3	0.813	0.016	0	-0.251	0.251	0	0
1193		4	0.813	0.046	0	0.026	-0.026	0	0
1194		5	0.813	0.076	0	0.571	-0.571	0	0
1195	18	1	0.532	-0.08	0	0.571	-0.571	0	0
1196		2	0.532	-0.047	0	-0.048	0.048	0	0
1197		3	0.532	-0.015	0	-0.349	0.349	0	0
1198		4	0.532	0.018	0	-0.333	0.333	0	0
1199		5	0.532	0.051	0	0	0	0	0
1200	18	1	0.139	-0.044	0	0	0	0	0
1201		2	0.139	-0.014	0	-0.258	0.258	0	0
1202		3	0.139	0.016	0	-0.248	0.248	0	0
1203		4	0.139	0.046	0	0.03	-0.03	0	0
1204		5	0.139	0.076	0	0.577	-0.577	0	0
1205	18	1	0.414	-0.08	0	0.577	-0.577	0	0
1206		2	0.414	-0.048	0	-0.043	0.043	0	0
1207		3	0.414	-0.015	0	-0.346	0.346	0	0
1208		4	0.414	0.018	0	-0.332	0.332	0	0
1209		5	0.414	0.051	0	0	0	0	0
1210	18	1	-0.053	1.525	0	0	0	0	0
1211		2	-0.066	0.762	0	4.749	-4.749	0	0
1212		3	-0.08	0	0	6.332	-6.332	0	0
1213		4	-0.093	-0.762	0	4.749	-4.749	0	0
1214		5	-0.106	-1.525	0	0	0	0	0
1215	18	1	-0.114	0	0	0	0	0	0
1216		2	-0.127	0	0	0	0	0	0
1217		3	-0.14	0	0	0	0	0	0
1218		4	-0.154	0	0	0	0	0	0
1219		5	-0.167	0	0	0	0	0	0
1220	18	1	0.05	0.025	0	0	0	0	0
1221		2	0.042	0.008	0	0.181	-0.181	0	0
1222		3	0.035	-0.008	0	0.181	-0.181	0	0
1223		4	0.028	-0.025	0	0	0	0	0
1224		5	0.021	-0.042	0	-0.362	0.362	0	0
1225	18	1	0.733	-0.023	0	0	0	0	0
1226		2	0.74	-0.007	0	-0.156	0.156	0	0
1227		3	0.748	0.008	0	-0.153	0.153	0	0
1228		4	0.755	0.023	0	0.01	-0.01	0	0
1229		5	0.762	0.039	0	0.332	-0.332	0	0
1230	18	1	-0.012	0.042	0	-0.362	0.362	0	0
1231		2	-0.019	0.025	0	0	0	0	0
1232		3	-0.026	0.008	0	0.181	-0.181	0	0
1233		4	-0.033	-0.008	0	0.181	-0.181	0	0
1234		5	-0.041	-0.025	0	0	0	0	0
1235	18	1	0.789	-0.039	0	0.332	-0.332	0	0
1236		2	0.796	-0.023	0	0.01	-0.01	0	0
1237		3	0.804	-0.008	0	-0.153	0.153	0	0
1238		4	0.811	0.007	0	-0.156	0.156	0	0
1239		5	0.818	0.023	0	0	0	0	0
1240	18	1	0.346	-0.033	0	0	0	0	0
1241		2	0.353	-0.017	0	-0.272	0.272	0	0
1242		3	0.36	0	0	-0.362	0.362	0	0
1243		4	0.367	0.017	0	-0.272	0.272	0	0
1244		5	0.374	0.033	0	0	0	0	0
1245	18	1	0.414	-0.033	0	0	0	0	0
1246		2	0.421	-0.017	0	-0.272	0.272	0	0
1247		3	0.429	0	0	-0.362	0.362	0	0
1248		4	0.436	0.017	0	-0.272	0.272	0	0
1249		5	0.443	0.033	0	0	0	0	0
1250	18	1	-0.335	0.031	0	0	0	0	0
1251		2	-0.342	0.015	0	0.239	-0.239	0	0
1252		3	-0.35	0	0	0.319	-0.319	0	0
1253		4	-0.357	-0.015	0	0.239	-0.239	0	0
1254		5	-0.364	-0.031	0	0	0	0	0
1255	18	1	-0.399	0.031	0	0	0	0	0

Member Section Stresses (Continued)

LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
1256		2	-0.406	0.015	0	0.239	-0.239	0	0
1257		3	-0.413	0	0	0.319	-0.319	0	0
1258		4	-0.42	-0.015	0	0.239	-0.239	0	0
1259		5	-0.427	-0.031	0	0	0	0	0
1260	19	1	0.325	0	0	0	0	0	0
1261		2	0.325	0	0	0	0	0	0
1262		3	0.325	0	0	-0.001	0.001	0	0
1263		4	0.325	0	0	-0.001	0.001	0	0
1264		5	0.325	0	0	-0.002	0.002	0	0
1265	19	1	0.003	0	0	-0.002	0.002	0	0
1266		2	0.003	0	0	-0.001	0.001	0	0
1267		3	0.003	0	0	-0.001	0.001	0	0
1268		4	0.003	0	0	0	0	0	0
1269		5	0.003	0	0	0	0	0	0
1270	19	1	0.325	0	0	0	0	0	0
1271		2	0.325	0	0	0	0	0	0
1272		3	0.325	0	0	0.001	-0.001	0	0
1273		4	0.325	0	0	0.001	-0.001	0	0
1274		5	0.325	0	0	0.002	-0.002	0	0
1275	19	1	0.003	0	0	0.002	-0.002	0	0
1276		2	0.003	0	0	0.001	-0.001	0	0
1277		3	0.003	0	0	0.001	-0.001	0	0
1278		4	0.003	0	0	0	0	0	0
1279		5	0.003	0	0	0	0	0	0
1280	19	1	0.004	0	0	0	0	0	0
1281		2	0.004	0	0	0	0	0	0
1282		3	0.004	0	0	0	0	0	0
1283		4	0.004	0	0	0	0	0	0
1284		5	0.004	0	0	0	0	0	0
1285	19	1	-0.049	0.835	0	0	0	0	0
1286		2	-0.049	0.418	0	2.451	-2.451	0	0
1287		3	-0.049	0	0	3.268	-3.268	0	0
1288		4	-0.049	-0.418	0	2.451	-2.451	0	0
1289		5	-0.049	-0.835	0	0	0	0	0
1290	19	1	-0.009	0	0	0	0	0	0
1291		2	-0.009	0	0	0	0	0	0
1292		3	-0.009	0	0	0.001	-0.001	0	0
1293		4	-0.009	0	0	0.001	-0.001	0	0
1294		5	-0.009	0	0	0.001	-0.001	0	0
1295	19	1	0.146	0	0	0	0	0	0
1296		2	0.146	0	0	0	0	0	0
1297		3	0.146	0	0	-0.001	0.001	0	0
1298		4	0.146	0	0	-0.001	0.001	0	0
1299		5	0.146	0	0	-0.001	0.001	0	0
1300	19	1	-0.009	0	0	0.001	-0.001	0	0
1301		2	-0.009	0	0	0.001	-0.001	0	0
1302		3	-0.009	0	0	0.001	-0.001	0	0
1303		4	-0.009	0	0	0	0	0	0
1304		5	-0.009	0	0	0	0	0	0
1305	19	1	0.146	0	0	-0.001	0.001	0	0
1306		2	0.146	0	0	-0.001	0.001	0	0
1307		3	0.146	0	0	-0.001	0.001	0	0
1308		4	0.146	0	0	0	0	0	0
1309		5	0.146	0	0	0	0	0	0
1310	19	1	-0.009	0	0	0	0	0	0
1311		2	-0.009	0	0	0	0	0	0
1312		3	-0.009	0	0	0	0	0	0
1313		4	-0.009	0	0	0	0	0	0
1314		5	-0.009	0	0	0	0	0	0
1315	19	1	-0.009	0	0	0	0	0	0
1316		2	-0.009	0	0	0	0	0	0
1317		3	-0.009	0	0	0	0	0	0
1318		4	-0.009	0	0	0	0	0	0
1319		5	-0.009	0	0	0	0	0	0
1320	19	1	0.146	0	0	0	0	0	0
1321		2	0.146	0	0	0	0	0	0
1322		3	0.146	0	0	0	0	0	0
1323		4	0.146	0	0	0	0	0	0

Member Section Stresses (Continued)

LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
1324		5	0.146	0	0	0	0	0	0
1325	19	1	0.146	0	0	0	0	0	0
1326		2	0.146	0	0	0	0	0	0
1327		3	0.146	0	0	0	0	0	0
1328		4	0.146	0	0	0	0	0	0
1329		5	0.146	0	0	0	0	0	0
1330	20	1	0.476	0	0	0	0	0	0
1331		2	0.476	0	0	-0.001	0.001	0	0
1332		3	0.476	0	0	-0.002	0.002	0	0
1333		4	0.476	0	0	-0.002	0.002	0	0
1334		5	0.476	0	0	-0.003	0.003	0	0
1335	20	1	0.473	0	0	-0.003	0.003	0	0
1336		2	0.473	0	0	-0.002	0.002	0	0
1337		3	0.473	0	0	-0.002	0.002	0	0
1338		4	0.473	0	0	-0.001	0.001	0	0
1339		5	0.473	0	0	0	0	0	0
1340	20	1	0.476	0	0	0	0	0	0
1341		2	0.476	0	0	0.001	-0.001	0	0
1342		3	0.476	0	0	0.002	-0.002	0	0
1343		4	0.476	0	0	0.002	-0.002	0	0
1344		5	0.476	0	0	0.003	-0.003	0	0
1345	20	1	0.473	0	0	0.003	-0.003	0	0
1346		2	0.473	0	0	0.002	-0.002	0	0
1347		3	0.473	0	0	0.002	-0.002	0	0
1348		4	0.473	0	0	0.001	-0.001	0	0
1349		5	0.473	0	0	0	0	0	0
1350	20	1	-0.081	1.525	0	0	0	0	0
1351		2	-0.081	0.762	0	4.749	-4.749	0	0
1352		3	-0.081	0	0	6.332	-6.332	0	0
1353		4	-0.081	-0.762	0	4.749	-4.749	0	0
1354		5	-0.081	-1.525	0	0	0	0	0
1355	20	1	-0.138	0	0	0	0	0	0
1356		2	-0.138	0	0	0	0	0	0
1357		3	-0.138	0	0	0	0	0	0
1358		4	-0.138	0	0	0	0	0	0
1359		5	-0.138	0	0	0	0	0	0
1360	20	1	0.2	0	0	0	0	0	0
1361		2	0.2	0	0	0	0	0	0
1362		3	0.2	0	0	0.001	-0.001	0	0
1363		4	0.2	0	0	0.001	-0.001	0	0
1364		5	0.2	0	0	0.001	-0.001	0	0
1365	20	1	0.198	0	0	0	0	0	0
1366		2	0.198	0	0	-0.001	0.001	0	0
1367		3	0.198	0	0	-0.002	0.002	0	0
1368		4	0.198	0	0	-0.003	0.003	0	0
1369		5	0.198	0	0	-0.004	0.004	0	0
1370	20	1	0.2	0	0	0.001	-0.001	0	0
1371		2	0.2	0	0	0.001	-0.001	0	0
1372		3	0.2	0	0	0.001	-0.001	0	0
1373		4	0.2	0	0	0	0	0	0
1374		5	0.2	0	0	0	0	0	0
1375	20	1	0.198	0	0	-0.004	0.004	0	0
1376		2	0.198	0	0	-0.003	0.003	0	0
1377		3	0.198	0	0	-0.002	0.002	0	0
1378		4	0.198	0	0	-0.001	0.001	0	0
1379		5	0.198	0	0	0	0	0	0
1380	20	1	0.2	0	0	0	0	0	0
1381		2	0.2	0	0	0	0	0	0
1382		3	0.2	0	0	0	0	0	0
1383		4	0.2	0	0	0	0	0	0
1384		5	0.2	0	0	0	0	0	0
1385	20	1	0.2	0	0	0	0	0	0
1386		2	0.2	0	0	0	0	0	0
1387		3	0.2	0	0	0	0	0	0
1388		4	0.2	0	0	0	0	0	0
1389		5	0.2	0	0	0	0	0	0
1390	20	1	0.198	0	0	0	0	0	0
1391		2	0.198	0	0	0	0	0	0

Member Section Stresses (Continued)

LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
1392		3	0.198	0	0	0	0	0	0
1393		4	0.198	0	0	0	0	0	0
1394		5	0.198	0	0	0	0	0	0
1395	20	M15	1	0.198	0	0	0	0	0
1396		2	0.198	0	0	0	0	0	0
1397		3	0.198	0	0	0	0	0	0
1398		4	0.198	0	0	0	0	0	0
1399		5	0.198	0	0	0	0	0	0
1400	21	M1	1	-2.524	-0.001	0	0	0	0
1401		2	-2.524	-0.001	0	-0.01	0.01	0	0
1402		3	-2.524	-0.001	0	-0.02	0.02	0	0
1403		4	-2.524	-0.001	0	-0.03	0.03	0	0
1404		5	-2.524	-0.001	0	-0.04	0.04	0	0
1405	21	M2	1	-0.8	0.001	0	-0.04	0.04	0
1406		2	-0.8	0.001	0	-0.03	0.03	0	0
1407		3	-0.8	0.001	0	-0.02	0.02	0	0
1408		4	-0.8	0.001	0	-0.01	0.01	0	0
1409		5	-0.8	0.001	0	0	0	0	0
1410	21	M4	1	2.478	-0.001	0	0	0	0
1411		2	2.478	-0.001	0	-0.009	0.009	0	0
1412		3	2.478	-0.001	0	-0.018	0.018	0	0
1413		4	2.478	-0.001	0	-0.028	0.028	0	0
1414		5	2.478	-0.001	0	-0.037	0.037	0	0
1415	21	M5	1	0.652	0.001	0	-0.037	0.037	0
1416		2	0.652	0.001	0	-0.028	0.028	0	0
1417		3	0.652	0.001	0	-0.018	0.018	0	0
1418		4	0.652	0.001	0	-0.009	0.009	0	0
1419		5	0.652	0.001	0	0	0	0	0
1420	21	M6	1	0.721	0	0	0	0	0
1421		2	0.721	0	0	0	0	0	0
1422		3	0.721	0	0	0	0	0	0
1423		4	0.721	0	0	0	0	0	0
1424		5	0.721	0	0	0	0	0	0
1425	21	M10	1	0.293	0	0	0	0	0
1426		2	0.293	0	0	0	0	0	0
1427		3	0.293	0	0	0	0	0	0
1428		4	0.293	0	0	0	0	0	0
1429		5	0.293	0	0	0	0	0	0
1430	21	M7	1	2.168	0.001	0	0	0	0
1431		2	2.168	0.001	0	0.013	-0.013	0	0
1432		3	2.168	0.001	0	0.027	-0.027	0	0
1433		4	2.168	0.001	0	0.04	-0.04	0	0
1434		5	2.168	0.001	0	0.053	-0.053	0	0
1435	21	M8	1	-2.904	-0.003	0	0	0	0
1436		2	-2.904	-0.003	0	-0.033	0.033	0	0
1437		3	-2.904	-0.003	0	-0.065	0.065	0	0
1438		4	-2.904	-0.003	0	-0.098	0.098	0	0
1439		5	-2.904	-0.003	0	-0.131	0.131	0	0
1440	21	M9	1	2.168	-0.001	0	0.053	-0.053	0
1441		2	2.168	-0.001	0	0.04	-0.04	0	0
1442		3	2.168	-0.001	0	0.027	-0.027	0	0
1443		4	2.168	-0.001	0	0.013	-0.013	0	0
1444		5	2.168	-0.001	0	0	0	0	0
1445	21	M11	1	-2.903	0.003	0	-0.131	0.131	0
1446		2	-2.903	0.003	0	-0.098	0.098	0	0
1447		3	-2.903	0.003	0	-0.065	0.065	0	0
1448		4	-2.903	0.003	0	-0.033	0.033	0	0
1449		5	-2.903	0.003	0	0	0	0	0
1450	21	M12	1	-1.77	0	0	0	0	0
1451		2	-1.77	0	0	0	0	0	0
1452		3	-1.77	0	0	0	0	0	0
1453		4	-1.77	0	0	0	0	0	0
1454		5	-1.77	0	0	0	0	0	0
1455	21	M13	1	-1.771	0	0	0	0	0
1456		2	-1.771	0	0	0	0	0	0
1457		3	-1.771	0	0	0	0	0	0
1458		4	-1.771	0	0	0	0	0	0
1459		5	-1.771	0	0	0	0	0	0

Member Section Stresses (Continued)

LC	Member Label	Sec	Axial[ksi]	y Shear[ksi]	z Shear[ksi]	y top Bending[ksi]	y bot Bending[ksi]	z top Bending[ksi]	z bot Bending[ksi]
1460	21	M14	1	3.028	0	0	0	0	0
1461			2	3.028	0	0	0	0	0
1462			3	3.028	0	0	0	0	0
1463			4	3.028	0	0	0	0	0
1464			5	3.028	0	0	0	0	0
1465	21	M15	1	3.032	0	0	0	0	0
1466			2	3.032	0	0	0	0	0
1467			3	3.032	0	0	0	0	0
1468			4	3.032	0	0	0	0	0
1469			5	3.032	0	0	0	0	0

Member Section Deflections - Service

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
0	1	M1	1	0	0	0	NC	NC
1			2	-0.002	0.009	0	NC	NC
2			3	-0.003	0.014	0	NC	NC
3			4	-0.005	0.012	0	NC	NC
4			5	-0.006	0.012	0	NC	NC
5	1	M2	1	-0.006	0.012	0	NC	NC
6			2	-0.008	0.022	0	NC	NC
7			3	-0.009	0.03	0	NC	NC
8			4	-0.01	0.03	0	NC	NC
9			5	-0.011	0.022	0	NC	NC
10	1	M4	1	0	0	0	NC	NC
11			2	0	0.009	0	NC	NC
12			3	-0.001	0.013	0	NC	NC
13			4	-0.001	0.011	0	NC	NC
14			5	-0.001	0.011	0	NC	NC
15	1	M5	1	-0.001	0.011	0	NC	NC
16			2	-0.002	0.02	0	NC	NC
17			3	-0.003	0.029	0	NC	NC
18			4	-0.004	0.029	0	NC	NC
19			5	-0.005	0.021	0	NC	NC
20	1	M6	1	-0.022	-0.011	0	NC	NC
21			2	-0.022	-0.113	0	1811	NC
22			3	-0.021	-0.154	0	1290	NC
23			4	-0.021	-0.11	0	1811	NC
24			5	-0.021	-0.005	0	NC	NC
25	1	M10	1	-0.012	-0.006	0	NC	NC
26			2	-0.012	-0.005	0	NC	NC
27			3	-0.012	-0.004	0	NC	NC
28			4	-0.012	-0.002	0	NC	NC
29			5	-0.011	-0.001	0	NC	NC
30	1	M7	1	-0.007	-0.023	0	NC	NC
31			2	-0.007	-0.026	0	NC	NC
32			3	-0.007	-0.025	0	NC	NC
33			4	-0.007	-0.02	0	NC	NC
34			5	-0.007	-0.016	0	NC	NC
35	1	M8	1	0.009	0.007	0	NC	NC
36			2	0.008	0.009	0	NC	NC
37			3	0.007	0.008	0	NC	NC
38			4	0.006	0.005	0	NC	NC
39			5	0.005	0.002	0	NC	NC
40	1	M9	1	-0.007	-0.016	0	NC	NC
41			2	-0.007	-0.017	0	NC	NC
42			3	-0.007	-0.017	0	NC	NC
43			4	-0.007	-0.015	0	NC	NC
44			5	-0.007	-0.009	0	NC	NC
45	1	M11	1	0.005	0.002	0	NC	NC
46			2	0.003	0.003	0	NC	NC
47			3	0.002	0.005	0	NC	NC
48			4	0.001	0.004	0	NC	NC
49			5	0	0	0	NC	NC
50	1	M12	1	0.018	0.012	0	NC	NC
51			2	0.017	0.02	0	NC	NC
52			3	0.017	0.022	0	NC	NC
53			4	0.016	0.018	0	NC	NC
54			5	0.016	0.008	0	NC	NC

Member Section Deflections - Service (Continued)

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
55	1	M13	1	0.016	0.008	0	NC	NC
56		2	0.015	0.016	0	0	NC	NC
57		3	0.014	0.019	0	0	NC	NC
58		4	0.014	0.014	0	0	NC	NC
59		5	0.013	0.005	0	0	NC	NC
60	1	M14	1	-0.004	-0.013	0	NC	NC
61		2	-0.004	-0.018	0	0	NC	NC
62		3	-0.003	-0.019	0	0	NC	NC
63		4	-0.003	-0.014	0	0	NC	NC
64		5	-0.002	-0.005	0	0	NC	NC
65	1	M15	1	-0.002	-0.005	0	NC	NC
66		2	-0.002	-0.01	0	0	NC	NC
67		3	-0.001	-0.012	0	0	NC	NC
68		4	-0.001	-0.008	0	0	NC	NC
69		5	0	0	0	0	NC	NC
70	2	M1	1	0	0	0	NC	NC
71		2	-0.001	0	0	0	NC	NC
72		3	-0.001	0	0	0	NC	NC
73		4	-0.002	0	0	0	NC	NC
74		5	-0.003	0	0	0	NC	NC
75	2	M2	1	-0.003	0	0	NC	NC
76		2	-0.003	0	0	0	NC	NC
77		3	-0.003	0	0	0	NC	NC
78		4	-0.003	0	0	0	NC	NC
79		5	-0.003	0	0	0	NC	NC
80	2	M4	1	0	0	0	NC	NC
81		2	-0.001	0	0	0	NC	NC
82		3	-0.001	0	0	0	NC	NC
83		4	-0.002	0	0	0	NC	NC
84		5	-0.003	0	0	0	NC	NC
85	2	M5	1	-0.003	0	0	NC	NC
86		2	-0.003	0	0	0	NC	NC
87		3	-0.003	0	0	0	NC	NC
88		4	-0.003	0	0	0	NC	NC
89		5	-0.003	0	0	0	NC	NC
90	2	M6	1	0	-0.003	0	NC	NC
91		2	0	-0.003	0	0	NC	NC
92		3	0	-0.003	0	0	NC	NC
93		4	0	-0.003	0	0	NC	NC
94		5	0	-0.003	0	0	NC	NC
95	2	M10	1	0	-0.003	0	NC	NC
96		2	0	-0.049	0	0	4044	NC
97		3	0	-0.068	0	0	2881	NC
98		4	0	-0.049	0	0	4044	NC
99		5	0	-0.003	0	0	NC	NC
100	2	M7	1	0.002	-0.002	0	NC	NC
101		2	0.002	-0.002	0	0	NC	NC
102		3	0.002	-0.002	0	0	NC	NC
103		4	0.002	-0.002	0	0	NC	NC
104		5	0.002	-0.002	0	0	NC	NC
105	2	M8	1	0.002	-0.002	0	NC	NC
106		2	0.001	-0.002	0	0	NC	NC
107		3	0.001	-0.001	0	0	NC	NC
108		4	0.001	-0.001	0	0	NC	NC
109		5	0.001	-0.001	0	0	NC	NC
110	2	M9	1	0.002	-0.002	0	NC	NC
111		2	0.002	-0.002	0	0	NC	NC
112		3	0.002	-0.002	0	0	NC	NC
113		4	0.002	-0.002	0	0	NC	NC
114		5	0.002	-0.002	0	0	NC	NC
115	2	M11	1	0.001	-0.001	0	NC	NC
116		2	0.001	-0.001	0	0	NC	NC
117		3	0	0	0	0	NC	NC
118		4	0	0	0	0	NC	NC
119		5	0	0	0	0	NC	NC
120	2	M12	1	0.002	-0.002	0	NC	NC
121		2	0.002	-0.002	0	0	NC	NC
122		3	0.002	-0.002	0	0	NC	NC

Member Section Deflections - Service (Continued)

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
123		4	0.002	-0.002	0	0	NC	NC
124		5	0.002	-0.002	0	0	NC	NC
125	2	1	0.002	-0.002	0	0	NC	NC
126		2	0.002	-0.002	0	0	NC	NC
127		3	0.002	-0.002	0	0	NC	NC
128		4	0.002	-0.002	0	0	NC	NC
129		5	0.002	-0.002	0	0	NC	NC
130	2	1	0.002	-0.002	0	0	NC	NC
131		2	0.001	-0.002	0	0	NC	NC
132		3	0.001	-0.001	0	0	NC	NC
133		4	0.001	-0.001	0	0	NC	NC
134		5	0.001	-0.001	0	0	NC	NC
135	2	1	0.001	-0.001	0	0	NC	NC
136		2	0.001	-0.001	0	0	NC	NC
137		3	0	0	0	0	NC	NC
138		4	0	0	0	0	NC	NC
139		5	0	0	0	0	NC	NC
140	3	1	0	0	0	0	NC	NC
141		2	-0.002	0.01	0	0	NC	NC
142		3	-0.005	0.014	0	0	NC	NC
143		4	-0.007	0.013	0	0	NC	NC
144		5	-0.009	0.013	0	0	NC	NC
145	3	1	-0.009	0.013	0	0	NC	NC
146		2	-0.01	0.022	0	0	NC	NC
147		3	-0.011	0.03	0	0	NC	NC
148		4	-0.012	0.03	0	0	NC	NC
149		5	-0.014	0.022	0	0	NC	NC
150	3	1	0	0	0	0	NC	NC
151		2	-0.001	0.009	0	0	NC	NC
152		3	-0.002	0.013	0	0	NC	NC
153		4	-0.003	0.011	0	0	NC	NC
154		5	-0.004	0.011	0	0	NC	NC
155	3	1	-0.004	0.011	0	0	NC	NC
156		2	-0.005	0.02	0	0	NC	NC
157		3	-0.005	0.029	0	0	NC	NC
158		4	-0.006	0.029	0	0	NC	NC
159		5	-0.007	0.021	0	0	NC	NC
160	3	1	-0.022	-0.014	0	0	NC	NC
161		2	-0.022	-0.116	0	0	1811	NC
162		3	-0.021	-0.156	0	0	1290	NC
163		4	-0.021	-0.113	0	0	1811	NC
164		5	-0.021	-0.007	0	0	NC	NC
165	3	1	-0.013	-0.009	0	0	NC	NC
166		2	-0.012	-0.054	0	0	4044	NC
167		3	-0.012	-0.072	0	0	2881	NC
168		4	-0.011	-0.052	0	0	4044	NC
169		5	-0.011	-0.004	0	0	NC	NC
170	3	1	-0.005	-0.025	0	0	NC	NC
171		2	-0.005	-0.028	0	0	NC	NC
172		3	-0.005	-0.027	0	0	NC	NC
173		4	-0.005	-0.022	0	0	NC	NC
174		5	-0.005	-0.018	0	0	NC	NC
175	3	1	0.01	0.005	0	0	NC	NC
176		2	0.009	0.007	0	0	NC	NC
177		3	0.008	0.007	0	0	NC	NC
178		4	0.007	0.004	0	0	NC	NC
179		5	0.005	0.001	0	0	NC	NC
180	3	1	-0.005	-0.018	0	0	NC	NC
181		2	-0.005	-0.018	0	0	NC	NC
182		3	-0.005	-0.019	0	0	NC	NC
183		4	-0.005	-0.017	0	0	NC	NC
184		5	-0.005	-0.011	0	0	NC	NC
185	3	1	0.005	0.001	0	0	NC	NC
186		2	0.004	0.003	0	0	NC	NC
187		3	0.003	0.004	0	0	NC	NC
188		4	0.001	0.004	0	0	NC	NC
189		5	0	0	0	0	NC	NC
190	3	1	0.02	0.01	0	0	NC	NC

Member Section Deflections - Service (Continued)

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
191		2	0.019	0.018	0	0	NC	NC
192		3	0.019	0.021	0	0	NC	NC
193		4	0.018	0.016	0	0	NC	NC
194		5	0.018	0.006	0	0	NC	NC
195	3	1	0.018	0.006	0	0	NC	NC
196		2	0.017	0.014	0	0	NC	NC
197		3	0.016	0.017	0	0	NC	NC
198		4	0.016	0.013	0	0	NC	NC
199		5	0.015	0.003	0	0	NC	NC
200	3	1	-0.003	-0.015	0	0	NC	NC
201		2	-0.002	-0.02	0	0	NC	NC
202		3	-0.002	-0.02	0	0	NC	NC
203		4	-0.002	-0.015	0	0	NC	NC
204		5	-0.002	-0.005	0	0	NC	NC
205	3	1	-0.002	-0.005	0	0	NC	NC
206		2	-0.001	-0.011	0	0	NC	NC
207		3	-0.001	-0.013	0	0	NC	NC
208		4	0	-0.008	0	0	NC	NC
209		5	0	0	0	0	NC	NC
210	18	1	0	0	0	0	NC	NC
211		2	-0.002	0.009	0	0	NC	NC
212		3	-0.003	0.014	0	0	NC	NC
213		4	-0.005	0.012	0	0	NC	NC
214		5	-0.006	0.012	0	0	NC	NC
215	18	1	-0.006	0.012	0	0	NC	NC
216		2	-0.008	0.022	0	0	NC	NC
217		3	-0.009	0.03	0	0	NC	NC
218		4	-0.01	0.03	0	0	NC	NC
219		5	-0.011	0.022	0	0	NC	NC
220	18	1	0	0	0	0	NC	NC
221		2	0	0.009	0	0	NC	NC
222		3	-0.001	0.013	0	0	NC	NC
223		4	-0.001	0.011	0	0	NC	NC
224		5	-0.001	0.011	0	0	NC	NC
225	18	1	-0.001	0.011	0	0	NC	NC
226		2	-0.002	0.02	0	0	NC	NC
227		3	-0.003	0.029	0	0	NC	NC
228		4	-0.004	0.029	0	0	NC	NC
229		5	-0.005	0.021	0	0	NC	NC
230	18	1	-0.022	-0.011	0	0	NC	NC
231		2	-0.022	-0.113	0	0	1811	NC
232		3	-0.021	-0.154	0	0	1290	NC
233		4	-0.021	-0.11	0	0	1811	NC
234		5	-0.021	-0.005	0	0	NC	NC
235	18	1	-0.012	-0.006	0	0	NC	NC
236		2	-0.012	-0.005	0	0	NC	NC
237		3	-0.012	-0.004	0	0	NC	NC
238		4	-0.012	-0.002	0	0	NC	NC
239		5	-0.011	-0.001	0	0	NC	NC
240	18	1	-0.007	-0.023	0	0	NC	NC
241		2	-0.007	-0.026	0	0	NC	NC
242		3	-0.007	-0.025	0	0	NC	NC
243		4	-0.007	-0.02	0	0	NC	NC
244		5	-0.007	-0.016	0	0	NC	NC
245	18	1	0.009	0.007	0	0	NC	NC
246		2	0.008	0.009	0	0	NC	NC
247		3	0.007	0.008	0	0	NC	NC
248		4	0.006	0.005	0	0	NC	NC
249		5	0.005	0.002	0	0	NC	NC
250	18	1	-0.007	-0.016	0	0	NC	NC
251		2	-0.007	-0.017	0	0	NC	NC
252		3	-0.007	-0.017	0	0	NC	NC
253		4	-0.007	-0.015	0	0	NC	NC
254		5	-0.007	-0.009	0	0	NC	NC
255	18	1	0.005	0.002	0	0	NC	NC
256		2	0.003	0.003	0	0	NC	NC
257		3	0.002	0.005	0	0	NC	NC
258		4	0.001	0.004	0	0	NC	NC

Member Section Deflections - Service (Continued)

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
259		5	0	0	0	0	NC	NC
260	18	1	0.018	0.012	0	0	NC	NC
261		2	0.017	0.02	0	0	NC	NC
262		3	0.017	0.022	0	0	NC	NC
263		4	0.016	0.018	0	0	NC	NC
264		5	0.016	0.008	0	0	NC	NC
265	18	1	0.016	0.008	0	0	NC	NC
266		2	0.015	0.016	0	0	NC	NC
267		3	0.014	0.019	0	0	NC	NC
268		4	0.014	0.014	0	0	NC	NC
269		5	0.013	0.005	0	0	NC	NC
270	18	1	-0.004	-0.013	0	0	NC	NC
271		2	-0.004	-0.018	0	0	NC	NC
272		3	-0.003	-0.019	0	0	NC	NC
273		4	-0.003	-0.014	0	0	NC	NC
274		5	-0.002	-0.005	0	0	NC	NC
275	18	1	-0.002	-0.005	0	0	NC	NC
276		2	-0.002	-0.01	0	0	NC	NC
277		3	-0.001	-0.012	0	0	NC	NC
278		4	-0.001	-0.008	0	0	NC	NC
279		5	0	0	0	0	NC	NC
280	19	1	0	0	0	0	NC	NC
281		2	-0.001	0	0	0	NC	NC
282		3	-0.001	0	0	0	NC	NC
283		4	-0.002	0	0	0	NC	NC
284		5	-0.003	0	0	0	NC	NC
285	19	1	-0.003	0	0	0	NC	NC
286		2	-0.003	0	0	0	NC	NC
287		3	-0.003	0	0	0	NC	NC
288		4	-0.003	0	0	0	NC	NC
289		5	-0.003	0	0	0	NC	NC
290	19	1	0	0	0	0	NC	NC
291		2	-0.001	0	0	0	NC	NC
292		3	-0.001	0	0	0	NC	NC
293		4	-0.002	0	0	0	NC	NC
294		5	-0.003	0	0	0	NC	NC
295	19	1	-0.003	0	0	0	NC	NC
296		2	-0.003	0	0	0	NC	NC
297		3	-0.003	0	0	0	NC	NC
298		4	-0.003	0	0	0	NC	NC
299		5	-0.003	0	0	0	NC	NC
300	19	1	0	-0.003	0	0	NC	NC
301		2	0	-0.003	0	0	NC	NC
302		3	0	-0.003	0	0	NC	NC
303		4	0	-0.003	0	0	NC	NC
304		5	0	-0.003	0	0	NC	NC
305	19	1	0	-0.003	0	0	NC	NC
306		2	0	-0.049	0	0	4044	NC
307		3	0	-0.068	0	0	2881	NC
308		4	0	-0.049	0	0	4044	NC
309		5	0	-0.003	0	0	NC	NC
310	19	1	0.002	-0.002	0	0	NC	NC
311		2	0.002	-0.002	0	0	NC	NC
312		3	0.002	-0.002	0	0	NC	NC
313		4	0.002	-0.002	0	0	NC	NC
314		5	0.002	-0.002	0	0	NC	NC
315	19	1	0.002	-0.002	0	0	NC	NC
316		2	0.001	-0.002	0	0	NC	NC
317		3	0.001	-0.001	0	0	NC	NC
318		4	0.001	-0.001	0	0	NC	NC
319		5	0.001	-0.001	0	0	NC	NC
320	19	1	0.002	-0.002	0	0	NC	NC
321		2	0.002	-0.002	0	0	NC	NC
322		3	0.002	-0.002	0	0	NC	NC
323		4	0.002	-0.002	0	0	NC	NC
324		5	0.002	-0.002	0	0	NC	NC
325	19	1	0.001	-0.001	0	0	NC	NC
326		2	0.001	-0.001	0	0	NC	NC

Member Section Deflections - Service (Continued)

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
327		3	0	0	0	0	NC	NC
328		4	0	0	0	0	NC	NC
329		5	0	0	0	0	NC	NC
330	19	1	0.002	-0.002	0	0	NC	NC
331		2	0.002	-0.002	0	0	NC	NC
332		3	0.002	-0.002	0	0	NC	NC
333		4	0.002	-0.002	0	0	NC	NC
334		5	0.002	-0.002	0	0	NC	NC
335	19	1	0.002	-0.002	0	0	NC	NC
336		2	0.002	-0.002	0	0	NC	NC
337		3	0.002	-0.002	0	0	NC	NC
338		4	0.002	-0.002	0	0	NC	NC
339		5	0.002	-0.002	0	0	NC	NC
340	19	1	0.002	-0.002	0	0	NC	NC
341		2	0.001	-0.002	0	0	NC	NC
342		3	0.001	-0.001	0	0	NC	NC
343		4	0.001	-0.001	0	0	NC	NC
344		5	0.001	-0.001	0	0	NC	NC
345	19	1	0.001	-0.001	0	0	NC	NC
346		2	0.001	-0.001	0	0	NC	NC
347		3	0	0	0	0	NC	NC
348		4	0	0	0	0	NC	NC
349		5	0	0	0	0	NC	NC
350	20	1	0	0	0	0	NC	NC
351		2	-0.001	0	0	0	NC	NC
352		3	-0.002	0	0	0	NC	NC
353		4	-0.003	0	0	0	NC	NC
354		5	-0.004	0.001	0	0	NC	NC
355	20	1	-0.004	0.001	0	0	NC	NC
356		2	-0.005	0.001	0	0	NC	NC
357		3	-0.006	0.001	0	0	NC	NC
358		4	-0.007	0	0	0	NC	NC
359		5	-0.008	0	0	0	NC	NC
360	20	1	0	0	0	0	NC	NC
361		2	-0.001	0	0	0	NC	NC
362		3	-0.002	0	0	0	NC	NC
363		4	-0.003	0	0	0	NC	NC
364		5	-0.004	-0.001	0	0	NC	NC
365	20	1	-0.004	-0.001	0	0	NC	NC
366		2	-0.005	-0.001	0	0	NC	NC
367		3	-0.006	-0.001	0	0	NC	NC
368		4	-0.007	0	0	0	NC	NC
369		5	-0.008	0	0	0	NC	NC
370	20	1	0	-0.008	0	0	NC	NC
371		2	0	-0.112	0	0	1811	NC
372		3	0	-0.154	0	0	1290	NC
373		4	0	-0.112	0	0	1811	NC
374		5	0	-0.008	0	0	NC	NC
375	20	1	-0.001	-0.004	0	0	NC	NC
376		2	0	-0.004	0	0	NC	NC
377		3	0	-0.004	0	0	NC	NC
378		4	0	-0.004	0	0	NC	NC
379		5	0.001	-0.004	0	0	NC	NC
380	20	1	0.005	-0.006	0	0	NC	NC
381		2	0.005	-0.005	0	0	NC	NC
382		3	0.005	-0.005	0	0	NC	NC
383		4	0.005	-0.004	0	0	NC	NC
384		5	0.004	-0.004	0	0	NC	NC
385	20	1	0.002	-0.003	0	0	NC	NC
386		2	0.002	-0.003	0	0	NC	NC
387		3	0.002	-0.002	0	0	NC	NC
388		4	0.001	-0.002	0	0	NC	NC
389		5	0.001	-0.001	0	0	NC	NC
390	20	1	0.004	-0.004	0	0	NC	NC
391		2	0.004	-0.004	0	0	NC	NC
392		3	0.004	-0.003	0	0	NC	NC
393		4	0.003	-0.003	0	0	NC	NC
394		5	0.003	-0.002	0	0	NC	NC

Member Section Deflections - Service (Continued)

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
395	20	M11	1	0.001	-0.001	0	NC	NC
396		2	0.001	-0.001	0	0	NC	NC
397		3	0.001	0	0	0	NC	NC
398		4	0	0	0	0	NC	NC
399		5	0	0	0	0	NC	NC
400	20	M12	1	0.005	-0.006	0	NC	NC
401		2	0.005	-0.005	0	0	NC	NC
402		3	0.005	-0.005	0	0	NC	NC
403		4	0.005	-0.004	0	0	NC	NC
404		5	0.004	-0.004	0	0	NC	NC
405	20	M13	1	0.004	-0.004	0	NC	NC
406		2	0.004	-0.004	0	0	NC	NC
407		3	0.004	-0.003	0	0	NC	NC
408		4	0.003	-0.003	0	0	NC	NC
409		5	0.003	-0.002	0	0	NC	NC
410	20	M14	1	0.002	-0.003	0	NC	NC
411		2	0.002	-0.003	0	0	NC	NC
412		3	0.002	-0.002	0	0	NC	NC
413		4	0.001	-0.002	0	0	NC	NC
414		5	0.001	-0.001	0	0	NC	NC
415	20	M15	1	0.001	-0.001	0	NC	NC
416		2	0.001	-0.001	0	0	NC	NC
417		3	0.001	-0.001	0	0	NC	NC
418		4	0	0	0	0	NC	NC
419		5	0	0	0	0	NC	NC
420	21	M1	1	0	0	0	NC	NC
421		2	0.005	-0.016	0	0	NC	NC
422		3	0.01	-0.033	0	0	5589	NC
423		4	0.015	-0.05	0	0	3683	NC
424		5	0.02	-0.068	0	0	2719	NC
425	21	M2	1	0.02	-0.068	0	NC	NC
426		2	0.022	-0.088	0	0	9897	NC
427		3	0.023	-0.109	0	0	4851	NC
428		4	0.025	-0.13	0	0	3186	NC
429		5	0.027	-0.152	0	0	2364	NC
430	21	M4	1	0	0	0	NC	NC
431		2	-0.005	-0.016	0	0	NC	NC
432		3	-0.01	-0.032	0	0	5784	NC
433		4	-0.015	-0.048	0	0	3814	NC
434		5	-0.02	-0.065	0	0	2818	NC
435	21	M5	1	-0.02	-0.065	0	NC	NC
436		2	-0.021	-0.085	0	0	NC	NC
437		3	-0.022	-0.105	0	0	5053	NC
438		4	-0.024	-0.126	0	0	3320	NC
439		5	-0.025	-0.146	0	0	2465	NC
440	21	M6	1	0.152	0.027	0	NC	NC
441		2	0.151	0.014	0	0	NC	NC
442		3	0.149	0.001	0	0	NC	NC
443		4	0.148	-0.012	0	0	NC	NC
444		5	0.146	-0.025	0	0	NC	NC
445	21	M10	1	0.068	0.02	0	NC	NC
446		2	0.067	0.01	0	0	NC	NC
447		3	0.066	0	0	0	NC	NC
448		4	0.066	-0.01	0	0	NC	NC
449		5	0.065	-0.02	0	0	NC	NC
450	21	M7	1	0.085	0.129	0	NC	NC
451		2	0.081	0.115	0	0	NC	NC
452		3	0.078	0.102	0	0	NC	NC
453		4	0.075	0.088	0	0	NC	NC
454		5	0.072	0.076	0	0	NC	NC
455	21	M8	1	-0.033	-0.06	0	NC	NC
456		2	-0.029	-0.047	0	0	NC	NC
457		3	-0.025	-0.036	0	0	NC	NC
458		4	-0.021	-0.025	0	0	NC	NC
459		5	-0.016	-0.017	0	0	NC	NC
460	21	M9	1	0.072	0.076	0	NC	NC
461		2	0.069	0.065	0	0	NC	NC
462		3	0.065	0.054	0	0	NC	NC

Member Section Deflections - Service (Continued)

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
463		4	0.062	0.044	0	0	NC	NC
464		5	0.059	0.034	0	0	NC	NC
465	21	1	-0.016	-0.017	0	0	NC	NC
466		2	-0.012	-0.01	0	0	NC	NC
467		3	-0.008	-0.006	0	0	NC	NC
468		4	-0.004	-0.003	0	0	NC	NC
469		5	0	0	0	0	NC	NC
470	21	1	-0.082	-0.124	0	0	NC	NC
471		2	-0.079	-0.112	0	0	NC	NC
472		3	-0.077	-0.1	0	0	NC	NC
473		4	-0.074	-0.088	0	0	NC	NC
474		5	-0.071	-0.076	0	0	NC	NC
475	21	1	-0.071	-0.076	0	0	NC	NC
476		2	-0.069	-0.066	0	0	NC	NC
477		3	-0.066	-0.056	0	0	NC	NC
478		4	-0.064	-0.046	0	0	NC	NC
479		5	-0.061	-0.036	0	0	NC	NC
480	21	1	0.034	0.062	0	0	NC	NC
481		2	0.03	0.05	0	0	NC	NC
482		3	0.026	0.039	0	0	NC	NC
483		4	0.021	0.027	0	0	NC	NC
484		5	0.017	0.016	0	0	NC	NC
485	21	1	0.017	0.016	0	0	NC	NC
486		2	0.013	0.012	0	0	NC	NC
487		3	0.009	0.008	0	0	NC	NC
488		4	0.004	0.004	0	0	NC	NC
489		5	0	0	0	0	NC	NC

Member Section Deflections - Strength

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
0	4	1	0	0	0	0	NC	NC
1		2	-0.002	0.013	0	0	NC	NC
2		3	-0.005	0.019	0	0	NC	NC
3		4	-0.007	0.017	0	0	NC	NC
4		5	-0.009	0.017	0	0	NC	NC
5	4	1	-0.009	0.017	0	0	NC	NC
6		2	-0.011	0.03	0	0	NC	NC
7		3	-0.012	0.042	0	0	NC	NC
8		4	-0.014	0.042	0	0	NC	NC
9		5	-0.015	0.03	0	0	NC	NC
10	4	1	0	0	0	0	NC	NC
11		2	0	0.013	0	0	NC	NC
12		3	-0.001	0.018	0	0	NC	NC
13		4	-0.001	0.016	0	0	NC	NC
14		5	-0.002	0.016	0	0	NC	NC
15	4	1	-0.002	0.016	0	0	NC	NC
16		2	-0.003	0.029	0	0	NC	NC
17		3	-0.004	0.041	0	0	NC	NC
18		4	-0.005	0.041	0	0	NC	NC
19		5	-0.007	0.029	0	0	NC	NC
20	4	1	-0.03	-0.015	0	0	NC	NC
21		2	-0.03	-0.159	0	0	1294	NC
22		3	-0.03	-0.215	0	0	922	NC
23		4	-0.03	-0.154	0	0	1294	NC
24		5	-0.029	-0.007	0	0	NC	NC
25	4	1	-0.017	-0.009	0	0	NC	NC
26		2	-0.017	-0.007	0	0	NC	NC
27		3	-0.017	-0.005	0	0	NC	NC
28		4	-0.016	-0.003	0	0	NC	NC
29		5	-0.016	-0.002	0	0	NC	NC
30	4	1	-0.01	-0.033	0	0	NC	NC
31		2	-0.01	-0.036	0	0	NC	NC
32		3	-0.01	-0.035	0	0	NC	NC
33		4	-0.01	-0.028	0	0	NC	NC
34		5	-0.01	-0.023	0	0	NC	NC
35	4	1	0.012	0.01	0	0	NC	NC
36		2	0.011	0.013	0	0	NC	NC
37		3	0.009	0.012	0	0	NC	NC

Member Section Deflections - Strength (Continued)

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
38		4	0.008	0.007	0	0	NC	NC
39		5	0.006	0.003	0	0	NC	NC
40	4	1	-0.01	-0.023	0	0	NC	NC
41		2	-0.01	-0.023	0	0	NC	NC
42		3	-0.01	-0.024	0	0	NC	NC
43		4	-0.01	-0.021	0	0	NC	NC
44		5	-0.01	-0.013	0	0	NC	NC
45	4	1	0.006	0.003	0	0	NC	NC
46		2	0.005	0.005	0	0	NC	NC
47		3	0.003	0.007	0	0	NC	NC
48		4	0.002	0.005	0	0	NC	NC
49		5	0	0	0	0	NC	NC
50	4	1	0.025	0.017	0	0	NC	NC
51		2	0.024	0.028	0	0	NC	NC
52		3	0.023	0.031	0	0	7997	NC
53		4	0.023	0.025	0	0	NC	NC
54		5	0.022	0.011	0	0	NC	NC
55	4	1	0.022	0.011	0	0	NC	NC
56		2	0.021	0.022	0	0	NC	NC
57		3	0.02	0.026	0	0	7997	NC
58		4	0.019	0.02	0	0	NC	NC
59		5	0.018	0.006	0	0	NC	NC
60	4	1	-0.006	-0.019	0	0	NC	NC
61		2	-0.005	-0.025	0	0	NC	NC
62		3	-0.005	-0.026	0	0	9472	NC
63		4	-0.004	-0.019	0	0	NC	NC
64		5	-0.003	-0.006	0	0	NC	NC
65	4	1	-0.003	-0.006	0	0	NC	NC
66		2	-0.002	-0.015	0	0	NC	NC
67		3	-0.002	-0.017	0	0	9472	NC
68		4	-0.001	-0.011	0	0	NC	NC
69		5	0	0	0	0	NC	NC
70	5	1	0	0	0	0	NC	NC
71		2	-0.003	0.012	0	0	NC	NC
72		3	-0.007	0.017	0	0	NC	NC
73		4	-0.01	0.015	0	0	NC	NC
74		5	-0.014	0.015	0	0	NC	NC
75	5	1	-0.014	0.015	0	0	NC	NC
76		2	-0.016	0.026	0	0	NC	NC
77		3	-0.018	0.037	0	0	NC	NC
78		4	-0.019	0.036	0	0	NC	NC
79		5	-0.021	0.026	0	0	NC	NC
80	5	1	0	0	0	0	NC	NC
81		2	-0.002	0.011	0	0	NC	NC
82		3	-0.004	0.015	0	0	NC	NC
83		4	-0.006	0.013	0	0	NC	NC
84		5	-0.007	0.013	0	0	NC	NC
85	5	1	-0.007	0.013	0	0	NC	NC
86		2	-0.009	0.024	0	0	NC	NC
87		3	-0.011	0.034	0	0	NC	NC
88		4	-0.012	0.035	0	0	NC	NC
89		5	-0.014	0.025	0	0	NC	NC
90	5	1	-0.026	-0.021	0	0	NC	NC
91		2	-0.026	-0.196	0	0	1065	NC
92		3	-0.026	-0.265	0	0	759	NC
93		4	-0.025	-0.192	0	0	1065	NC
94		5	-0.025	-0.014	0	0	NC	NC
95	5	1	-0.015	-0.014	0	0	NC	NC
96		2	-0.015	-0.087	0	0	2527	NC
97		3	-0.014	-0.115	0	0	1800	NC
98		4	-0.014	-0.083	0	0	2527	NC
99		5	-0.013	-0.007	0	0	NC	NC
100	5	1	-0.002	-0.034	0	0	NC	NC
101		2	-0.003	-0.036	0	0	NC	NC
102		3	-0.003	-0.035	0	0	NC	NC
103		4	-0.003	-0.03	0	0	NC	NC
104		5	-0.003	-0.024	0	0	NC	NC
105	5	1	0.014	0.004	0	0	NC	NC

Member Section Deflections - Strength (Continued)

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
106		2	0.013	0.007	0	0	NC	NC
107		3	0.011	0.007	0	0	NC	NC
108		4	0.009	0.004	0	0	NC	NC
109		5	0.007	0.001	0	0	NC	NC
110	5	1	-0.003	-0.024	0	0	NC	NC
111		2	-0.003	-0.025	0	0	NC	NC
112		3	-0.003	-0.025	0	0	NC	NC
113		4	-0.003	-0.022	0	0	NC	NC
114		5	-0.003	-0.014	0	0	NC	NC
115	5	1	0.007	0.001	0	0	NC	NC
116		2	0.006	0.003	0	0	NC	NC
117		3	0.004	0.005	0	0	NC	NC
118		4	0.002	0.004	0	0	NC	NC
119		5	0	0	0	0	NC	NC
120	5	1	0.027	0.009	0	0	NC	NC
121		2	0.026	0.018	0	0	NC	NC
122		3	0.026	0.022	0	0	9330	NC
123		4	0.025	0.016	0	0	NC	NC
124		5	0.024	0.005	0	0	NC	NC
125	5	1	0.024	0.005	0	0	NC	NC
126		2	0.023	0.014	0	0	NC	NC
127		3	0.022	0.018	0	0	9330	NC
128		4	0.021	0.013	0	0	NC	NC
129		5	0.021	0.002	0	0	NC	NC
130	5	1	-0.001	-0.021	0	0	NC	NC
131		2	-0.001	-0.026	0	0	NC	NC
132		3	-0.001	-0.026	0	0	NC	NC
133		4	-0.001	-0.019	0	0	NC	NC
134		5	-0.001	-0.007	0	0	NC	NC
135	5	1	-0.001	-0.007	0	0	NC	NC
136		2	-0.001	-0.014	0	0	NC	NC
137		3	0	-0.016	0	0	NC	NC
138		4	0	-0.01	0	0	NC	NC
139		5	0	0	0	0	NC	NC
140	6	1	0	0	0	0	NC	NC
141		2	-0.003	0.011	0	0	NC	NC
142		3	-0.006	0.016	0	0	NC	NC
143		4	-0.009	0.015	0	0	NC	NC
144		5	-0.012	0.015	0	0	NC	NC
145	6	1	-0.012	0.015	0	0	NC	NC
146		2	-0.013	0.026	0	0	NC	NC
147		3	-0.015	0.036	0	0	NC	NC
148		4	-0.016	0.036	0	0	NC	NC
149		5	-0.017	0.026	0	0	NC	NC
150	6	1	0	0	0	0	NC	NC
151		2	-0.001	0.011	0	0	NC	NC
152		3	-0.003	0.015	0	0	NC	NC
153		4	-0.004	0.013	0	0	NC	NC
154		5	-0.005	0.013	0	0	NC	NC
155	6	1	-0.005	0.013	0	0	NC	NC
156		2	-0.007	0.024	0	0	NC	NC
157		3	-0.008	0.035	0	0	NC	NC
158		4	-0.009	0.035	0	0	NC	NC
159		5	-0.01	0.025	0	0	NC	NC
160	6	1	-0.026	-0.017	0	0	NC	NC
161		2	-0.026	-0.14	0	0	1509	NC
162		3	-0.026	-0.188	0	0	1075	NC
163		4	-0.025	-0.136	0	0	1509	NC
164		5	-0.025	-0.01	0	0	NC	NC
165	6	1	-0.015	-0.012	0	0	NC	NC
166		2	-0.015	-0.085	0	0	2527	NC
167		3	-0.014	-0.113	0	0	1800	NC
168		4	-0.014	-0.081	0	0	2527	NC
169		5	-0.013	-0.005	0	0	NC	NC
170	6	1	-0.005	-0.031	0	0	NC	NC
171		2	-0.005	-0.034	0	0	NC	NC
172		3	-0.005	-0.033	0	0	NC	NC
173		4	-0.005	-0.027	0	0	NC	NC

Member Section Deflections - Strength (Continued)

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
174		5	-0.005	-0.022	0	0	NC	NC
175	6	1	0.013	0.005	0	0	NC	NC
176		2	0.012	0.008	0	0	NC	NC
177		3	0.01	0.008	0	0	NC	NC
178		4	0.008	0.004	0	0	NC	NC
179		5	0.007	0.001	0	0	NC	NC
180	6	1	-0.005	-0.022	0	0	NC	NC
181		2	-0.005	-0.023	0	0	NC	NC
182		3	-0.005	-0.024	0	0	NC	NC
183		4	-0.005	-0.021	0	0	NC	NC
184		5	-0.005	-0.013	0	0	NC	NC
185	6	1	0.007	0.001	0	0	NC	NC
186		2	0.005	0.003	0	0	NC	NC
187		3	0.003	0.005	0	0	NC	NC
188		4	0.002	0.004	0	0	NC	NC
189		5	0	0	0	0	NC	NC
190	6	1	0.024	0.012	0	0	NC	NC
191		2	0.024	0.021	0	0	NC	NC
192		3	0.023	0.024	0	0	9330	NC
193		4	0.023	0.018	0	0	NC	NC
194		5	0.022	0.007	0	0	NC	NC
195	6	1	0.022	0.007	0	0	NC	NC
196		2	0.021	0.016	0	0	NC	NC
197		3	0.02	0.02	0	0	9330	NC
198		4	0.02	0.014	0	0	NC	NC
199		5	0.019	0.003	0	0	NC	NC
200	6	1	-0.003	-0.019	0	0	NC	NC
201		2	-0.002	-0.024	0	0	NC	NC
202		3	-0.002	-0.025	0	0	NC	NC
203		4	-0.002	-0.018	0	0	NC	NC
204		5	-0.001	-0.007	0	0	NC	NC
205	6	1	-0.001	-0.007	0	0	NC	NC
206		2	-0.001	-0.014	0	0	NC	NC
207		3	-0.001	-0.015	0	0	NC	NC
208		4	0	-0.01	0	0	NC	NC
209		5	0	0	0	0	NC	NC
210	7	1	0	0	0	0	NC	NC
211		2	-0.004	0.012	0	0	NC	NC
212		3	-0.008	0.017	0	0	NC	NC
213		4	-0.011	0.016	0	0	NC	NC
214		5	-0.015	0.016	0	0	NC	NC
215	7	1	-0.015	0.016	0	0	NC	NC
216		2	-0.018	0.027	0	0	NC	NC
217		3	-0.021	0.037	0	0	NC	NC
218		4	-0.024	0.037	0	0	NC	NC
219		5	-0.027	0.027	0	0	NC	NC
220	7	1	0	0	0	0	NC	NC
221		2	-0.002	0.011	0	0	NC	NC
222		3	-0.004	0.015	0	0	NC	NC
223		4	-0.006	0.013	0	0	NC	NC
224		5	-0.009	0.012	0	0	NC	NC
225	7	1	-0.009	0.012	0	0	NC	NC
226		2	-0.011	0.023	0	0	NC	NC
227		3	-0.014	0.034	0	0	NC	NC
228		4	-0.017	0.034	0	0	NC	NC
229		5	-0.019	0.025	0	0	NC	NC
230	7	1	-0.027	-0.027	0	0	NC	NC
231		2	-0.026	-0.316	0	0	647	NC
232		3	-0.026	-0.431	0	0	461	NC
233		4	-0.025	-0.312	0	0	647	NC
234		5	-0.025	-0.019	0	0	NC	NC
235	7	1	-0.016	-0.015	0	0	NC	NC
236		2	-0.015	-0.037	0	0	8087	NC
237		3	-0.014	-0.044	0	0	5762	NC
238		4	-0.013	-0.034	0	0	8087	NC
239		5	-0.012	-0.009	0	0	NC	NC
240	7	1	0.002	-0.038	0	0	NC	NC
241		2	0.001	-0.04	0	0	NC	NC

Member Section Deflections - Strength (Continued)

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
242		3	0	-0.038	0	0	NC	NC
243		4	0	-0.032	0	0	NC	NC
244		5	-0.001	-0.027	0	0	NC	NC
245	7	1	0.015	0.003	0	0	NC	NC
246		2	0.013	0.006	0	0	NC	NC
247		3	0.011	0.006	0	0	NC	NC
248		4	0.01	0.003	0	0	NC	NC
249		5	0.008	0	0	0	NC	NC
250	7	1	-0.001	-0.027	0	0	NC	NC
251		2	-0.001	-0.027	0	0	NC	NC
252		3	-0.001	-0.027	0	0	NC	NC
253		4	-0.002	-0.023	0	0	NC	NC
254		5	-0.002	-0.015	0	0	NC	NC
255	7	1	0.008	0	0	0	NC	NC
256		2	0.006	0.002	0	0	NC	NC
257		3	0.004	0.005	0	0	NC	NC
258		4	0.002	0.004	0	0	NC	NC
259		5	0	0	0	0	NC	NC
260	7	1	0.031	0.005	0	0	NC	NC
261		2	0.03	0.015	0	0	NC	NC
262		3	0.029	0.018	0	0	9330	NC
263		4	0.028	0.013	0	0	NC	NC
264		5	0.027	0.002	0	0	NC	NC
265	7	1	0.027	0.002	0	0	NC	NC
266		2	0.026	0.012	0	0	NC	NC
267		3	0.024	0.016	0	0	9330	NC
268		4	0.023	0.012	0	0	NC	NC
269		5	0.022	0.001	0	0	NC	NC
270	7	1	-0.001	-0.022	0	0	NC	NC
271		2	-0.001	-0.027	0	0	NC	NC
272		3	-0.001	-0.027	0	0	NC	NC
273		4	-0.001	-0.02	0	0	NC	NC
274		5	-0.001	-0.008	0	0	NC	NC
275	7	1	-0.001	-0.008	0	0	NC	NC
276		2	0	-0.014	0	0	NC	NC
277		3	0	-0.016	0	0	NC	NC
278		4	0	-0.01	0	0	NC	NC
279		5	0	0	0	0	NC	NC
280	8	1	0	0	0	0	NC	NC
281		2	-0.001	0.003	0	0	NC	NC
282		3	-0.002	0	0	0	NC	NC
283		4	-0.003	-0.009	0	0	NC	NC
284		5	-0.004	-0.018	0	0	NC	NC
285	8	1	-0.004	-0.018	0	0	NC	NC
286		2	-0.006	-0.017	0	0	NC	NC
287		3	-0.008	-0.017	0	0	NC	NC
288		4	-0.01	-0.028	0	0	NC	NC
289		5	-0.012	-0.05	0	0	6352	NC
290	8	1	0	0	0	0	NC	NC
291		2	-0.004	0.003	0	0	NC	NC
292		3	-0.009	-0.001	0	0	NC	NC
293		4	-0.013	-0.011	0	0	NC	NC
294		5	-0.017	-0.02	0	0	9158	NC
295	8	1	-0.017	-0.02	0	0	NC	NC
296		2	-0.021	-0.019	0	0	NC	NC
297		3	-0.024	-0.018	0	0	NC	NC
298		4	-0.027	-0.028	0	0	NC	NC
299		5	-0.031	-0.049	0	0	7035	NC
300	8	1	0.05	-0.012	0	0	NC	NC
301		2	0.049	-0.308	0	0	647	NC
302		3	0.049	-0.43	0	0	461	NC
303		4	0.049	-0.317	0	0	647	NC
304		5	0.049	-0.031	0	0	NC	NC
305	8	1	0.018	-0.004	0	0	NC	NC
306		2	0.019	-0.007	0	0	NC	NC
307		3	0.019	-0.01	0	0	NC	NC
308		4	0.02	-0.014	0	0	NC	NC
309		5	0.02	-0.017	0	0	NC	NC

Member Section Deflections - Strength (Continued)

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
310	8	M7	1	0.043	0.028	0	NC	NC
311			2	0.041	0.018	0	NC	NC
312			3	0.039	0.013	0	NC	NC
313			4	0.037	0.013	0	NC	NC
314			5	0.034	0.012	0	NC	NC
315	8	M8	1	-0.002	-0.026	0	NC	NC
316			2	-0.002	-0.017	0	NC	NC
317			3	-0.002	-0.011	0	NC	NC
318			4	-0.001	-0.009	0	NC	NC
319			5	-0.001	-0.008	0	NC	NC
320	8	M9	1	0.034	0.012	0	NC	NC
321			2	0.032	0.007	0	NC	NC
322			3	0.03	0.001	0	NC	NC
323			4	0.028	0	0	NC	NC
324			5	0.026	0.003	0	NC	NC
325	8	M11	1	-0.001	-0.008	0	NC	NC
326			2	-0.001	-0.003	0	NC	NC
327			3	0	0.002	0	NC	NC
328			4	0	0.003	0	NC	NC
329			5	0	0	0	NC	NC
330	8	M12	1	-0.011	-0.056	0	NC	NC
331			2	-0.011	-0.041	0	NC	NC
332			3	-0.01	-0.031	0	9330	NC
333			4	-0.01	-0.03	0	NC	NC
334			5	-0.01	-0.035	0	NC	NC
335	8	M13	1	-0.01	-0.035	0	NC	NC
336			2	-0.01	-0.02	0	NC	NC
337			3	-0.01	-0.011	0	9330	NC
338			4	-0.01	-0.01	0	NC	NC
339			5	-0.01	-0.016	0	NC	NC
340	8	M14	1	0.016	0.01	0	NC	NC
341			2	0.014	-0.001	0	NC	NC
342			3	0.012	-0.007	0	NC	NC
343			4	0.01	-0.005	0	NC	NC
344			5	0.008	0.001	0	NC	NC
345	8	M15	1	0.008	0.001	0	NC	NC
346			2	0.006	-0.008	0	NC	NC
347			3	0.004	-0.011	0	NC	NC
348			4	0.002	-0.008	0	NC	NC
349			5	0	0	0	NC	NC
350	9	M1	1	0	0	0	NC	NC
351			2	-0.006	0.02	0	NC	NC
352			3	-0.012	0.033	0	NC	NC
353			4	-0.018	0.041	0	NC	NC
354			5	-0.024	0.05	0	NC	NC
355	9	M2	1	-0.024	0.05	0	NC	NC
356			2	-0.028	0.071	0	NC	NC
357			3	-0.032	0.092	0	NC	NC
358			4	-0.035	0.102	0	NC	NC
359			5	-0.039	0.103	0	NC	NC
360	9	M4	1	0	0	0	NC	NC
361			2	0.001	0.019	0	NC	NC
362			3	0.001	0.031	0	NC	NC
363			4	0.002	0.037	0	NC	NC
364			5	0.002	0.045	0	NC	NC
365	9	M5	1	0.002	0.045	0	NC	NC
366			2	0	0.066	0	NC	NC
367			3	-0.002	0.087	0	NC	NC
368			4	-0.004	0.097	0	NC	NC
369			5	-0.006	0.098	0	NC	NC
370	9	M6	1	-0.103	-0.039	0	NC	NC
371			2	-0.102	-0.321	0	647	NC
372			3	-0.1	-0.43	0	461	NC
373			4	-0.099	-0.305	0	647	NC
374			5	-0.098	-0.006	0	NC	NC
375	9	M10	1	-0.05	-0.024	0	NC	NC
376			2	-0.048	-0.017	0	NC	NC
377			3	-0.047	-0.011	0	NC	NC

Member Section Deflections - Strength (Continued)

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
378		4	-0.046	-0.004	0	0	NC	NC
379		5	-0.045	0.002	0	0	NC	NC
380	9	1	-0.042	-0.102	0	0	NC	NC
381		2	-0.041	-0.097	0	0	NC	NC
382		3	-0.04	-0.088	0	0	NC	NC
383		4	-0.039	-0.076	0	0	NC	NC
384		5	-0.038	-0.064	0	0	NC	NC
385	9	1	0.031	0.033	0	0	NC	NC
386		2	0.027	0.031	0	0	NC	NC
387		3	0.023	0.025	0	0	NC	NC
388		4	0.019	0.016	0	0	NC	NC
389		5	0.015	0.009	0	0	NC	NC
390	9	1	-0.038	-0.064	0	0	NC	NC
391		2	-0.036	-0.058	0	0	NC	NC
392		3	-0.035	-0.053	0	0	NC	NC
393		4	-0.034	-0.044	0	0	NC	NC
394		5	-0.033	-0.031	0	0	NC	NC
395	9	1	0.015	0.009	0	0	NC	NC
396		2	0.012	0.008	0	0	NC	NC
397		3	0.008	0.008	0	0	NC	NC
398		4	0.004	0.005	0	0	NC	NC
399		5	0	0	0	0	NC	NC
400	9	1	0.071	0.068	0	0	NC	NC
401		2	0.069	0.072	0	0	NC	NC
402		3	0.066	0.069	0	0	9330	NC
403		4	0.064	0.058	0	0	NC	NC
404		5	0.061	0.041	0	0	NC	NC
405	9	1	0.061	0.041	0	0	NC	NC
406		2	0.059	0.046	0	0	NC	NC
407		3	0.056	0.045	0	0	9330	NC
408		4	0.054	0.036	0	0	NC	NC
409		5	0.051	0.02	0	0	NC	NC
410	9	1	-0.019	-0.052	0	0	NC	NC
411		2	-0.017	-0.051	0	0	NC	NC
412		3	-0.014	-0.045	0	0	NC	NC
413		4	-0.012	-0.033	0	0	NC	NC
414		5	-0.01	-0.015	0	0	NC	NC
415	9	1	-0.01	-0.015	0	0	NC	NC
416		2	-0.007	-0.02	0	0	NC	NC
417		3	-0.005	-0.02	0	0	NC	NC
418		4	-0.002	-0.012	0	0	NC	NC
419		5	0	0	0	0	NC	NC
420	10	1	0	0	0	0	NC	NC
421		2	0.001	0.003	0	0	NC	NC
422		3	0.001	0	0	0	NC	NC
423		4	0.002	-0.01	0	0	NC	NC
424		5	0.002	-0.019	0	0	9679	NC
425	10	1	0.002	-0.019	0	0	NC	NC
426		2	0.002	-0.018	0	0	NC	NC
427		3	0.001	-0.018	0	0	NC	NC
428		4	0.001	-0.029	0	0	NC	NC
429		5	0	-0.05	0	0	6431	NC
430	10	1	0	0	0	0	NC	NC
431		2	-0.003	0.003	0	0	NC	NC
432		3	-0.006	0	0	0	NC	NC
433		4	-0.008	-0.01	0	0	NC	NC
434		5	-0.011	-0.019	0	0	9589	NC
435	10	1	-0.011	-0.019	0	0	NC	NC
436		2	-0.013	-0.018	0	0	NC	NC
437		3	-0.015	-0.018	0	0	NC	NC
438		4	-0.016	-0.028	0	0	NC	NC
439		5	-0.018	-0.048	0	0	6950	NC
440	10	1	0.05	0	0	0	NC	NC
441		2	0.05	-0.129	0	0	1509	NC
442		3	0.049	-0.184	0	0	1075	NC
443		4	0.048	-0.138	0	0	1509	NC
444		5	0.048	-0.018	0	0	NC	NC
445	10	1	0.019	0.002	0	0	NC	NC

Member Section Deflections - Strength (Continued)

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
446		2	0.019	-0.001	0	0	NC	NC
447		3	0.019	-0.004	0	0	NC	NC
448		4	0.019	-0.008	0	0	NC	NC
449		5	0.019	-0.011	0	0	NC	NC
450	10	1	0.034	0.037	0	0	NC	NC
451		2	0.033	0.027	0	0	NC	NC
452		3	0.031	0.021	0	0	NC	NC
453		4	0.029	0.02	0	0	NC	NC
454		5	0.027	0.019	0	0	NC	NC
455	10	1	-0.006	-0.021	0	0	NC	NC
456		2	-0.005	-0.013	0	0	NC	NC
457		3	-0.004	-0.008	0	0	NC	NC
458		4	-0.004	-0.007	0	0	NC	NC
459		5	-0.003	-0.006	0	0	NC	NC
460	10	1	0.027	0.019	0	0	NC	NC
461		2	0.026	0.012	0	0	NC	NC
462		3	0.024	0.006	0	0	NC	NC
463		4	0.023	0.004	0	0	NC	NC
464		5	0.021	0.006	0	0	NC	NC
465	10	1	-0.003	-0.006	0	0	NC	NC
466		2	-0.002	-0.001	0	0	NC	NC
467		3	-0.001	0.003	0	0	NC	NC
468		4	-0.001	0.003	0	0	NC	NC
469		5	0	0	0	0	NC	NC
470	10	1	-0.02	-0.047	0	0	NC	NC
471		2	-0.019	-0.032	0	0	NC	NC
472		3	-0.018	-0.023	0	0	9330	NC
473		4	-0.018	-0.023	0	0	NC	NC
474		5	-0.017	-0.029	0	0	NC	NC
475	10	1	-0.017	-0.029	0	0	NC	NC
476		2	-0.016	-0.014	0	0	NC	NC
477		3	-0.016	-0.006	0	0	9330	NC
478		4	-0.015	-0.006	0	0	NC	NC
479		5	-0.015	-0.012	0	0	NC	NC
480	10	1	0.012	0.015	0	0	NC	NC
481		2	0.01	0.003	0	0	NC	NC
482		3	0.009	-0.003	0	0	NC	NC
483		4	0.007	-0.003	0	0	NC	NC
484		5	0.006	0.003	0	0	NC	NC
485	10	1	0.006	0.003	0	0	NC	NC
486		2	0.004	-0.007	0	0	NC	NC
487		3	0.003	-0.011	0	0	NC	NC
488		4	0.001	-0.008	0	0	NC	NC
489		5	0	0	0	0	NC	NC
490	11	1	0	0	0	0	NC	NC
491		2	-0.004	0.02	0	0	NC	NC
492		3	-0.009	0.033	0	0	NC	NC
493		4	-0.013	0.04	0	0	NC	NC
494		5	-0.018	0.049	0	0	NC	NC
495	11	1	-0.018	0.049	0	0	NC	NC
496		2	-0.02	0.07	0	0	NC	NC
497		3	-0.022	0.091	0	0	NC	NC
498		4	-0.024	0.101	0	0	NC	NC
499		5	-0.027	0.102	0	0	NC	NC
500	11	1	0	0	0	0	NC	NC
501		2	0.002	0.019	0	0	NC	NC
502		3	0.004	0.031	0	0	NC	NC
503		4	0.006	0.038	0	0	NC	NC
504		5	0.009	0.046	0	0	NC	NC
505	11	1	0.009	0.046	0	0	NC	NC
506		2	0.008	0.067	0	0	NC	NC
507		3	0.008	0.087	0	0	NC	NC
508		4	0.007	0.098	0	0	NC	NC
509		5	0.007	0.099	0	0	NC	NC
510	11	1	-0.102	-0.027	0	0	NC	NC
511		2	-0.101	-0.143	0	0	1509	NC
512		3	-0.1	-0.185	0	0	1075	NC
513		4	-0.099	-0.126	0	0	1509	NC

Member Section Deflections - Strength (Continued)

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
514		5	-0.099	0.007	0	0	NC	NC
515	11	1	-0.049	-0.018	0	0	NC	NC
516		2	-0.048	-0.011	0	0	NC	NC
517		3	-0.047	-0.005	0	0	NC	NC
518		4	-0.047	0.002	0	0	NC	NC
519		5	-0.046	0.009	0	0	NC	NC
520	11	1	-0.051	-0.093	0	0	NC	NC
521		2	-0.049	-0.089	0	0	NC	NC
522		3	-0.047	-0.08	0	0	NC	NC
523		4	-0.046	-0.069	0	0	NC	NC
524		5	-0.044	-0.057	0	0	NC	NC
525	11	1	0.027	0.038	0	0	NC	NC
526		2	0.024	0.035	0	0	NC	NC
527		3	0.02	0.028	0	0	NC	NC
528		4	0.017	0.019	0	0	NC	NC
529		5	0.014	0.011	0	0	NC	NC
530	11	1	-0.044	-0.057	0	0	NC	NC
531		2	-0.043	-0.052	0	0	NC	NC
532		3	-0.041	-0.048	0	0	NC	NC
533		4	-0.039	-0.04	0	0	NC	NC
534		5	-0.038	-0.028	0	0	NC	NC
535	11	1	0.014	0.011	0	0	NC	NC
536		2	0.01	0.009	0	0	NC	NC
537		3	0.007	0.009	0	0	NC	NC
538		4	0.003	0.006	0	0	NC	NC
539		5	0	0	0	0	NC	NC
540	11	1	0.062	0.077	0	0	NC	NC
541		2	0.06	0.08	0	0	NC	NC
542		3	0.058	0.077	0	0	9330	NC
543		4	0.056	0.066	0	0	NC	NC
544		5	0.055	0.048	0	0	NC	NC
545	11	1	0.055	0.048	0	0	NC	NC
546		2	0.052	0.052	0	0	NC	NC
547		3	0.05	0.05	0	0	9330	NC
548		4	0.048	0.04	0	0	NC	NC
549		5	0.046	0.023	0	0	NC	NC
550	11	1	-0.022	-0.047	0	0	NC	NC
551		2	-0.02	-0.047	0	0	NC	NC
552		3	-0.017	-0.042	0	0	NC	NC
553		4	-0.014	-0.03	0	0	NC	NC
554		5	-0.011	-0.013	0	0	NC	NC
555	11	1	-0.011	-0.013	0	0	NC	NC
556		2	-0.009	-0.019	0	0	NC	NC
557		3	-0.006	-0.019	0	0	NC	NC
558		4	-0.003	-0.012	0	0	NC	NC
559		5	0	0	0	0	NC	NC
560	12	1	0	0	0	0	NC	NC
561		2	0.002	-0.005	0	0	NC	NC
562		3	0.005	-0.016	0	0	NC	NC
563		4	0.007	-0.035	0	0	5294	NC
564		5	0.009	-0.052	0	0	3505	NC
565	12	1	0.009	-0.052	0	0	NC	NC
566		2	0.009	-0.062	0	0	NC	NC
567		3	0.009	-0.072	0	0	NC	NC
568		4	0.009	-0.094	0	0	4796	NC
569		5	0.008	-0.126	0	0	2715	NC
570	12	1	0	0	0	0	NC	NC
571		2	-0.006	-0.005	0	0	NC	NC
572		3	-0.012	-0.017	0	0	NC	NC
573		4	-0.018	-0.035	0	0	5277	NC
574		5	-0.024	-0.052	0	0	3522	NC
575	12	1	-0.024	-0.052	0	0	NC	NC
576		2	-0.027	-0.061	0	0	NC	NC
577		3	-0.03	-0.07	0	0	NC	NC
578		4	-0.033	-0.091	0	0	5183	NC
579		5	-0.036	-0.121	0	0	2892	NC
580	12	1	0.126	0.008	0	0	NC	NC
581		2	0.125	-0.179	0	0	1065	NC

Member Section Deflections - Strength (Continued)

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
582		3	0.124	-0.262	0	0	759	NC
583		4	0.123	-0.201	0	0	1065	NC
584		5	0.121	-0.036	0	0	NC	NC
585	12	1	0.052	0.009	0	0	NC	NC
586		2	0.052	-0.022	0	0	8087	NC
587		3	0.052	-0.04	0	0	5762	NC
588		4	0.052	-0.039	0	0	8087	NC
589		5	0.052	-0.024	0	0	NC	NC
590	12	1	0.08	0.098	0	0	NC	NC
591		2	0.077	0.081	0	0	NC	NC
592		3	0.073	0.069	0	0	NC	NC
593		4	0.07	0.061	0	0	NC	NC
594		5	0.067	0.054	0	0	NC	NC
595	12	1	-0.02	-0.054	0	0	NC	NC
596		2	-0.018	-0.039	0	0	NC	NC
597		3	-0.015	-0.028	0	0	NC	NC
598		4	-0.013	-0.021	0	0	NC	NC
599		5	-0.01	-0.015	0	0	NC	NC
600	12	1	0.067	0.054	0	0	NC	NC
601		2	0.063	0.042	0	0	NC	NC
602		3	0.06	0.031	0	0	NC	NC
603		4	0.057	0.024	0	0	NC	NC
604		5	0.053	0.021	0	0	NC	NC
605	12	1	-0.01	-0.015	0	0	NC	NC
606		2	-0.008	-0.007	0	0	NC	NC
607		3	-0.005	-0.001	0	0	NC	NC
608		4	-0.003	0.002	0	0	NC	NC
609		5	0	0	0	0	NC	NC
610	12	1	-0.057	-0.113	0	0	NC	NC
611		2	-0.055	-0.092	0	0	NC	NC
612		3	-0.053	-0.077	0	0	9330	NC
613		4	-0.051	-0.07	0	0	NC	NC
614		5	-0.049	-0.07	0	0	NC	NC
615	12	1	-0.049	-0.07	0	0	NC	NC
616		2	-0.048	-0.05	0	0	NC	NC
617		3	-0.046	-0.036	0	0	9330	NC
618		4	-0.044	-0.031	0	0	NC	NC
619		5	-0.043	-0.032	0	0	NC	NC
620	12	1	0.031	0.043	0	0	NC	NC
621		2	0.027	0.026	0	0	NC	NC
622		3	0.023	0.015	0	0	NC	NC
623		4	0.019	0.01	0	0	NC	NC
624		5	0.015	0.01	0	0	NC	NC
625	12	1	0.015	0.01	0	0	NC	NC
626		2	0.012	-0.001	0	0	NC	NC
627		3	0.008	-0.007	0	0	NC	NC
628		4	0.004	-0.006	0	0	NC	NC
629		5	0	0	0	0	NC	NC
630	13	1	0	0	0	0	NC	NC
631		2	-0.008	0.028	0	0	NC	NC
632		3	-0.015	0.049	0	0	NC	NC
633		4	-0.023	0.065	0	0	NC	NC
634		5	-0.031	0.083	0	0	NC	NC
635	13	1	-0.031	0.083	0	0	NC	NC
636		2	-0.035	0.114	0	0	NC	NC
637		3	-0.038	0.145	0	0	NC	NC
638		4	-0.042	0.167	0	0	NC	NC
639		5	-0.045	0.179	0	0	NC	NC
640	13	1	0	0	0	0	NC	NC
641		2	0.004	0.027	0	0	NC	NC
642		3	0.008	0.047	0	0	NC	NC
643		4	0.011	0.062	0	0	NC	NC
644		5	0.015	0.078	0	0	NC	NC
645	13	1	0.015	0.078	0	0	NC	NC
646		2	0.015	0.109	0	0	NC	NC
647		3	0.015	0.139	0	0	NC	NC
648		4	0.015	0.16	0	0	NC	NC
649		5	0.014	0.172	0	0	NC	NC

Member Section Deflections - Strength (Continued)

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
650	13	M6	1	-0.179	-0.045	0	NC	NC
651		2	-0.177	-0.207	0	0	1065	NC
652		3	-0.175	-0.263	0	0	759	NC
653		4	-0.173	-0.177	0	0	1065	NC
654		5	-0.172	0.014	0	0	NC	NC
655	13	M10	1	-0.083	-0.031	0	NC	NC
656		2	-0.082	-0.043	0	0	8087	NC
657		3	-0.081	-0.041	0	0	5762	NC
658		4	-0.08	-0.02	0	0	8087	NC
659		5	-0.078	0.015	0	0	NC	NC
660	13	M7	1	-0.089	-0.161	0	NC	NC
661		2	-0.086	-0.15	0	0	NC	NC
662		3	-0.083	-0.135	0	0	NC	NC
663		4	-0.08	-0.116	0	0	NC	NC
664		5	-0.077	-0.098	0	0	NC	NC
665	13	M8	1	0.045	0.066	0	NC	NC
666		2	0.04	0.056	0	0	NC	NC
667		3	0.034	0.044	0	0	NC	NC
668		4	0.029	0.03	0	0	NC	NC
669		5	0.023	0.019	0	0	NC	NC
670	13	M9	1	-0.077	-0.098	0	NC	NC
671		2	-0.074	-0.087	0	0	NC	NC
672		3	-0.071	-0.077	0	0	NC	NC
673		4	-0.068	-0.064	0	0	NC	NC
674		5	-0.065	-0.047	0	0	NC	NC
675	13	M11	1	0.023	0.019	0	NC	NC
676		2	0.017	0.014	0	0	NC	NC
677		3	0.011	0.011	0	0	NC	NC
678		4	0.006	0.007	0	0	NC	NC
679		5	0	0	0	0	NC	NC
680	13	M12	1	0.107	0.135	0	NC	NC
681		2	0.104	0.132	0	0	NC	NC
682		3	0.1	0.124	0	0	9330	NC
683		4	0.097	0.107	0	0	NC	NC
684		5	0.093	0.083	0	0	NC	NC
685	13	M13	1	0.093	0.083	0	NC	NC
686		2	0.09	0.083	0	0	NC	NC
687		3	0.086	0.076	0	0	9330	NC
688		4	0.083	0.061	0	0	NC	NC
689		5	0.079	0.039	0	0	NC	NC
690	13	M14	1	-0.038	-0.08	0	NC	NC
691		2	-0.033	-0.074	0	0	NC	NC
692		3	-0.028	-0.063	0	0	NC	NC
693		4	-0.024	-0.045	0	0	NC	NC
694		5	-0.019	-0.023	0	0	NC	NC
695	13	M15	1	-0.019	-0.023	0	NC	NC
696		2	-0.014	-0.025	0	0	NC	NC
697		3	-0.01	-0.023	0	0	NC	NC
698		4	-0.005	-0.014	0	0	NC	NC
699		5	0	0	0	0	NC	NC
700	14	M1	1	0	0	0	NC	NC
701		2	0.003	-0.005	0	0	NC	NC
702		3	0.005	-0.017	0	0	NC	NC
703		4	0.008	-0.035	0	0	5259	NC
704		5	0.011	-0.053	0	0	3487	NC
705	14	M2	1	0.011	-0.053	0	NC	NC
706		2	0.011	-0.062	0	0	NC	NC
707		3	0.012	-0.073	0	0	NC	NC
708		4	0.012	-0.094	0	0	4804	NC
709		5	0.012	-0.126	0	0	2720	NC
710	14	M4	1	0	0	0	NC	NC
711		2	-0.006	-0.005	0	0	NC	NC
712		3	-0.011	-0.016	0	0	NC	NC
713		4	-0.017	-0.035	0	0	5314	NC
714		5	-0.022	-0.052	0	0	3542	NC
715	14	M5	1	-0.022	-0.052	0	NC	NC
716		2	-0.025	-0.06	0	0	NC	NC
717		3	-0.027	-0.07	0	0	NC	NC

Member Section Deflections - Strength (Continued)

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
718		4	-0.03	-0.091	0	0	5177	NC
719		5	-0.032	-0.121	0	0	2887	NC
720	14	1	0.126	0.012	0	0	NC	NC
721		2	0.125	-0.123	0	0	1509	NC
722		3	0.124	-0.185	0	0	1075	NC
723		4	0.122	-0.146	0	0	1509	NC
724		5	0.121	-0.032	0	0	NC	NC
725	14	1	0.053	0.011	0	0	NC	NC
726		2	0.053	-0.021	0	0	8087	NC
727		3	0.052	-0.038	0	0	5762	NC
728		4	0.052	-0.037	0	0	8087	NC
729		5	0.052	-0.022	0	0	NC	NC
730	14	1	0.077	0.1	0	0	NC	NC
731		2	0.074	0.084	0	0	NC	NC
732		3	0.071	0.071	0	0	NC	NC
733		4	0.068	0.063	0	0	NC	NC
734		5	0.064	0.056	0	0	NC	NC
735	14	1	-0.022	-0.052	0	0	NC	NC
736		2	-0.019	-0.037	0	0	NC	NC
737		3	-0.016	-0.026	0	0	NC	NC
738		4	-0.013	-0.02	0	0	NC	NC
739		5	-0.011	-0.015	0	0	NC	NC
740	14	1	0.064	0.056	0	0	NC	NC
741		2	0.061	0.044	0	0	NC	NC
742		3	0.058	0.032	0	0	NC	NC
743		4	0.055	0.025	0	0	NC	NC
744		5	0.052	0.023	0	0	NC	NC
745	14	1	-0.011	-0.015	0	0	NC	NC
746		2	-0.008	-0.007	0	0	NC	NC
747		3	-0.005	0	0	0	NC	NC
748		4	-0.003	0.002	0	0	NC	NC
749		5	0	0	0	0	NC	NC
750	14	1	-0.06	-0.11	0	0	NC	NC
751		2	-0.058	-0.089	0	0	NC	NC
752		3	-0.056	-0.074	0	0	9330	NC
753		4	-0.054	-0.068	0	0	NC	NC
754		5	-0.052	-0.068	0	0	NC	NC
755	14	1	-0.052	-0.068	0	0	NC	NC
756		2	-0.05	-0.048	0	0	NC	NC
757		3	-0.048	-0.035	0	0	9330	NC
758		4	-0.046	-0.03	0	0	NC	NC
759		5	-0.044	-0.031	0	0	NC	NC
760	14	1	0.03	0.045	0	0	NC	NC
761		2	0.026	0.028	0	0	NC	NC
762		3	0.022	0.016	0	0	NC	NC
763		4	0.019	0.01	0	0	NC	NC
764		5	0.015	0.01	0	0	NC	NC
765	14	1	0.015	0.01	0	0	NC	NC
766		2	0.011	-0.001	0	0	NC	NC
767		3	0.007	-0.007	0	0	NC	NC
768		4	0.004	-0.006	0	0	NC	NC
769		5	0	0	0	0	NC	NC
770	15	1	0	0	0	0	NC	NC
771		2	-0.007	0.028	0	0	NC	NC
772		3	-0.015	0.049	0	0	NC	NC
773		4	-0.022	0.065	0	0	NC	NC
774		5	-0.029	0.083	0	0	NC	NC
775	15	1	-0.029	0.083	0	0	NC	NC
776		2	-0.032	0.114	0	0	NC	NC
777		3	-0.035	0.145	0	0	NC	NC
778		4	-0.038	0.167	0	0	NC	NC
779		5	-0.041	0.178	0	0	NC	NC
780	15	1	0	0	0	0	NC	NC
781		2	0.004	0.027	0	0	NC	NC
782		3	0.009	0.047	0	0	NC	NC
783		4	0.013	0.062	0	0	NC	NC
784		5	0.017	0.079	0	0	NC	NC
785	15	1	0.017	0.079	0	0	NC	NC

Member Section Deflections - Strength (Continued)

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
786		2	0.017	0.109	0	0	NC	NC
787		3	0.018	0.14	0	0	NC	NC
788		4	0.018	0.161	0	0	NC	NC
789		5	0.018	0.172	0	0	NC	NC
790	15	1	-0.178	-0.041	0	0	NC	NC
791		2	-0.177	-0.151	0	0	1509	NC
792		3	-0.175	-0.186	0	0	1075	NC
793		4	-0.173	-0.121	0	0	1509	NC
794		5	-0.172	0.018	0	0	NC	NC
795	15	1	-0.083	-0.029	0	0	NC	NC
796		2	-0.082	-0.041	0	0	8087	NC
797		3	-0.081	-0.039	0	0	5762	NC
798		4	-0.08	-0.018	0	0	8087	NC
799		5	-0.079	0.017	0	0	NC	NC
800	15	1	-0.092	-0.158	0	0	NC	NC
801		2	-0.089	-0.147	0	0	NC	NC
802		3	-0.086	-0.132	0	0	NC	NC
803		4	-0.083	-0.114	0	0	NC	NC
804		5	-0.079	-0.096	0	0	NC	NC
805	15	1	0.044	0.067	0	0	NC	NC
806		2	0.039	0.057	0	0	NC	NC
807		3	0.033	0.045	0	0	NC	NC
808		4	0.028	0.031	0	0	NC	NC
809		5	0.022	0.019	0	0	NC	NC
810	15	1	-0.079	-0.096	0	0	NC	NC
811		2	-0.076	-0.085	0	0	NC	NC
812		3	-0.073	-0.076	0	0	NC	NC
813		4	-0.07	-0.063	0	0	NC	NC
814		5	-0.066	-0.046	0	0	NC	NC
815	15	1	0.022	0.019	0	0	NC	NC
816		2	0.017	0.014	0	0	NC	NC
817		3	0.011	0.012	0	0	NC	NC
818		4	0.006	0.007	0	0	NC	NC
819		5	0	0	0	0	NC	NC
820	15	1	0.104	0.138	0	0	NC	NC
821		2	0.101	0.135	0	0	NC	NC
822		3	0.098	0.126	0	0	9330	NC
823		4	0.094	0.109	0	0	NC	NC
824		5	0.091	0.085	0	0	NC	NC
825	15	1	0.091	0.085	0	0	NC	NC
826		2	0.088	0.084	0	0	NC	NC
827		3	0.084	0.077	0	0	9330	NC
828		4	0.081	0.062	0	0	NC	NC
829		5	0.078	0.04	0	0	NC	NC
830	15	1	-0.039	-0.079	0	0	NC	NC
831		2	-0.034	-0.073	0	0	NC	NC
832		3	-0.029	-0.062	0	0	NC	NC
833		4	-0.024	-0.045	0	0	NC	NC
834		5	-0.02	-0.022	0	0	NC	NC
835	15	1	-0.02	-0.022	0	0	NC	NC
836		2	-0.015	-0.025	0	0	NC	NC
837		3	-0.01	-0.023	0	0	NC	NC
838		4	-0.005	-0.014	0	0	NC	NC
839		5	0	0	0	0	NC	NC
840	16	1	0	0	0	0	NC	NC
841		2	0.004	-0.008	0	0	NC	NC
842		3	0.007	-0.021	0	0	8877	NC
843		4	0.011	-0.039	0	0	4743	NC
844		5	0.014	-0.057	0	0	3253	NC
845	16	1	0.014	-0.057	0	0	NC	NC
846		2	0.015	-0.068	0	0	NC	NC
847		3	0.016	-0.082	0	0	7928	NC
848		4	0.016	-0.103	0	0	4267	NC
849		5	0.017	-0.133	0	0	2624	NC
850	16	1	0	0	0	0	NC	NC
851		2	-0.005	-0.008	0	0	NC	NC
852		3	-0.01	-0.02	0	0	9084	NC
853		4	-0.015	-0.038	0	0	4847	NC

Member Section Deflections - Strength (Continued)

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
854		5	-0.021	-0.055	0	0	3333	NC
855	16	1	-0.021	-0.055	0	0	NC	NC
856		2	-0.023	-0.066	0	0	NC	NC
857		3	-0.025	-0.079	0	0	8508	NC
858		4	-0.027	-0.099	0	0	4537	NC
859		5	-0.029	-0.128	0	0	2766	NC
860	16	1	0.133	0.017	0	0	NC	NC
861		2	0.131	-0.088	0	0	2012	NC
862		3	0.13	-0.137	0	0	1434	NC
863		4	0.129	-0.111	0	0	2012	NC
864		5	0.128	-0.029	0	0	NC	NC
865	16	1	0.057	0.014	0	0	NC	NC
866		2	0.056	0.005	0	0	NC	NC
867		3	0.056	-0.003	0	0	NC	NC
868		4	0.056	-0.012	0	0	NC	NC
869		5	0.055	-0.021	0	0	NC	NC
870	16	1	0.079	0.108	0	0	NC	NC
871		2	0.075	0.092	0	0	NC	NC
872		3	0.072	0.079	0	0	NC	NC
873		4	0.069	0.07	0	0	NC	NC
874		5	0.066	0.061	0	0	NC	NC
875	16	1	-0.025	-0.053	0	0	NC	NC
876		2	-0.022	-0.039	0	0	NC	NC
877		3	-0.019	-0.028	0	0	NC	NC
878		4	-0.016	-0.021	0	0	NC	NC
879		5	-0.012	-0.015	0	0	NC	NC
880	16	1	0.066	0.061	0	0	NC	NC
881		2	0.062	0.05	0	0	NC	NC
882		3	0.059	0.038	0	0	NC	NC
883		4	0.056	0.031	0	0	NC	NC
884		5	0.053	0.026	0	0	NC	NC
885	16	1	-0.012	-0.015	0	0	NC	NC
886		2	-0.009	-0.008	0	0	NC	NC
887		3	-0.006	-0.002	0	0	NC	NC
888		4	-0.003	0.001	0	0	NC	NC
889		5	0	0	0	0	NC	NC
890	16	1	-0.066	-0.113	0	0	NC	NC
891		2	-0.064	-0.094	0	0	NC	NC
892		3	-0.062	-0.08	0	0	NC	NC
893		4	-0.059	-0.072	0	0	NC	NC
894		5	-0.057	-0.069	0	0	NC	NC
895	16	1	-0.057	-0.069	0	0	NC	NC
896		2	-0.055	-0.052	0	0	NC	NC
897		3	-0.053	-0.039	0	0	NC	NC
898		4	-0.051	-0.033	0	0	NC	NC
899		5	-0.049	-0.031	0	0	NC	NC
900	16	1	0.03	0.05	0	0	NC	NC
901		2	0.027	0.034	0	0	NC	NC
902		3	0.023	0.022	0	0	NC	NC
903		4	0.019	0.015	0	0	NC	NC
904		5	0.015	0.012	0	0	NC	NC
905	16	1	0.015	0.012	0	0	NC	NC
906		2	0.011	0.003	0	0	NC	NC
907		3	0.008	-0.003	0	0	NC	NC
908		4	0.004	-0.003	0	0	NC	NC
909		5	0	0	0	0	NC	NC
910	17	1	0	0	0	0	NC	NC
911		2	-0.006	0.025	0	0	NC	NC
912		3	-0.013	0.045	0	0	NC	NC
913		4	-0.019	0.061	0	0	NC	NC
914		5	-0.026	0.079	0	0	NC	NC
915	17	1	-0.026	0.079	0	0	NC	NC
916		2	-0.029	0.107	0	0	NC	NC
917		3	-0.031	0.136	0	0	NC	NC
918		4	-0.034	0.158	0	0	NC	NC
919		5	-0.037	0.172	0	0	NC	NC
920	17	1	0	0	0	0	NC	NC
921		2	0.005	0.024	0	0	NC	NC

Member Section Deflections - Strength (Continued)

LC	Member Label	Sec	x [in]	y [in]	z [in]	x Rotate[rad]	(n) L/y' Ratio	(n) L/z' Ratio
922		3	0.009	0.043	0	0	NC	NC
923		4	0.014	0.059	0	0	NC	NC
924		5	0.019	0.075	0	0	NC	NC
925	17	1	0.019	0.075	0	0	NC	NC
926		2	0.019	0.103	0	0	NC	NC
927		3	0.02	0.131	0	0	NC	NC
928		4	0.02	0.152	0	0	NC	NC
929		5	0.021	0.165	0	0	NC	NC
930	17	1	-0.172	-0.037	0	0	NC	NC
931		2	-0.17	-0.116	0	0	2012	NC
932		3	-0.169	-0.139	0	0	1434	NC
933		4	-0.167	-0.087	0	0	2012	NC
934		5	-0.165	0.021	0	0	NC	NC
935	17	1	-0.079	-0.026	0	0	NC	NC
936		2	-0.078	-0.015	0	0	NC	NC
937		3	-0.077	-0.004	0	0	NC	NC
938		4	-0.076	0.008	0	0	NC	NC
939		5	-0.075	0.019	0	0	NC	NC
940	17	1	-0.091	-0.15	0	0	NC	NC
941		2	-0.088	-0.138	0	0	NC	NC
942		3	-0.085	-0.124	0	0	NC	NC
943		4	-0.081	-0.107	0	0	NC	NC
944		5	-0.078	-0.091	0	0	NC	NC
945	17	1	0.041	0.066	0	0	NC	NC
946		2	0.036	0.056	0	0	NC	NC
947		3	0.031	0.043	0	0	NC	NC
948		4	0.026	0.03	0	0	NC	NC
949		5	0.021	0.019	0	0	NC	NC
950	17	1	-0.078	-0.091	0	0	NC	NC
951		2	-0.075	-0.08	0	0	NC	NC
952		3	-0.072	-0.07	0	0	NC	NC
953		4	-0.068	-0.057	0	0	NC	NC
954		5	-0.065	-0.042	0	0	NC	NC
955	17	1	0.021	0.019	0	0	NC	NC
956		2	0.015	0.013	0	0	NC	NC
957		3	0.01	0.01	0	0	NC	NC
958		4	0.005	0.006	0	0	NC	NC
959		5	0	0	0	0	NC	NC
960	17	1	0.098	0.135	0	0	NC	NC
961		2	0.095	0.13	0	0	NC	NC
962		3	0.092	0.12	0	0	NC	NC
963		4	0.089	0.104	0	0	NC	NC
964		5	0.086	0.084	0	0	NC	NC
965	17	1	0.086	0.084	0	0	NC	NC
966		2	0.082	0.081	0	0	NC	NC
967		3	0.079	0.073	0	0	NC	NC
968		4	0.076	0.059	0	0	NC	NC
969		5	0.073	0.04	0	0	NC	NC
970	17	1	-0.038	-0.074	0	0	NC	NC
971		2	-0.034	-0.067	0	0	NC	NC
972		3	-0.029	-0.056	0	0	NC	NC
973		4	-0.024	-0.04	0	0	NC	NC
974		5	-0.019	-0.02	0	0	NC	NC
975	17	1	-0.019	-0.02	0	0	NC	NC
976		2	-0.014	-0.021	0	0	NC	NC
977		3	-0.01	-0.019	0	0	NC	NC
978		4	-0.005	-0.011	0	0	NC	NC
979		5	0	0	0	0	NC	NC

Beam Deflections

	LC	Member Label	Span	Location [ft]	y' [in]	(n) L'/y' Ratio
0	1	M6	1	7.835	-0.146	1290
1	1	M10	1	15.67	0	NC
2	2	M6	1	15.67	0	NC
3	2	M10	1	7.835	-0.065	2881
4	3	M6	1	7.835	-0.146	1290
5	3	M10	1	7.835	-0.065	2881
6	4	M6	1	7.835	-0.204	922

Beam Deflections (Continued)

	LC	Member Label	Span	Location [ft]	y' [in]	(n) L/y' Ratio
7	4	M10	1	15.67	0	NC
8	5	M6	1	7.835	-0.248	759
9	5	M10	1	7.835	-0.104	1800
10	6	M6	1	7.835	-0.175	1075
11	6	M10	1	7.835	-0.104	1800
12	7	M6	1	7.835	-0.408	461
13	7	M10	1	7.835	-0.033	5762
14	8	M6	1	7.835	-0.408	461
15	8	M10	1	15.67	0	NC
16	9	M6	1	7.835	-0.408	461
17	9	M10	1	15.67	0	NC
18	10	M6	1	7.835	-0.175	1075
19	10	M10	1	15.67	0	NC
20	11	M6	1	7.835	-0.175	1075
21	11	M10	1	15.67	0	NC
22	12	M6	1	7.835	-0.248	759
23	12	M10	1	7.835	-0.033	5762
24	13	M6	1	7.835	-0.248	759
25	13	M10	1	7.835	-0.033	5762
26	14	M6	1	7.835	-0.175	1075
27	14	M10	1	7.835	-0.033	5762
28	15	M6	1	7.835	-0.175	1075
29	15	M10	1	7.835	-0.033	5762
30	16	M6	1	7.835	-0.131	1434
31	16	M10	1	15.67	0	NC
32	17	M6	1	7.835	-0.131	1434
33	17	M10	1	15.67	0	NC
34	18	M6	1	7.835	-0.146	1290
35	18	M10	1	15.67	0	NC
36	19	M6	1	15.67	0	NC
37	19	M10	1	7.835	-0.065	2881
38	20	M6	1	7.835	-0.146	1290
39	20	M10	1	15.67	0	NC
40	21	M6	1	15.67	0	NC
41	21	M10	1	15.67	0	NC

Beam Deflection Checks

Beam	Design Rule	Span	Defl [in]	Ratio	LC	Defl [in]	Ratio	LC	Defl [in]	Ratio	LC	
0	M6	Typical	1	-0.146	1290	1(DL)	0	NC	2(LL)	-0.146	1290	3(DL+LL)
1	M10	Typical	1	-4.337e-19	NC	1(DL)	-0.065	2881	2(LL)	-0.065	2881	3(DL+LL)

AISC 15TH (360-16): ASD Member Steel Code Checks

	LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Pnc/om [k]	Pnt/om [k]	Mnyy/om [k-ft]	Mnzz/om [k-ft]	Cb	Eqn
0	1	M1	HSS8X8X6	0.037	15.33	0.005	15.33	y	226.077	286.467	67.485	67.485	2.17	H1-1b*
1	1	M2	HSS8X8X6	0.03	0	0.005	0	y	216.519	286.467	67.485	67.485	1.799	H1-1b
2	1	M4	HSS8X8X6	0.021	15.33	0.005	15.33	y	226.077	286.467	67.485	67.485	2.185	H1-1b
3	1	M5	HSS8X8X6	0.028	0	0.005	0	y	216.519	286.467	67.485	67.485	1.826	H1-1b
4	1	M6	W14X30	0.19	7.835	0.076	15.67	y	83.318	264.97	22.43	118.014	1	H1-1b
5	1	M10	W16X36	0.006	15.67	0	15.67	y	104.147	317.365	26.946	93.991	1	H1-1b*
6	1	M7	HSS5X5X5	0.011	11.439	0.003	11.439	y	102.006	144.886	21.026	21.026	2.082	H1-1b
7	1	M8	HSS5X5X5	0.038	10.961	0.002	10.961	y	104.981	144.886	21.026	21.026	2.139	H1-1b*
8	1	M9	HSS5X5X5	0.011	0	0.003	0	y	102.006	144.886	21.026	21.026	2.082	H1-1b
9	1	M11	HSS5X5X5	0.041	10.961	0.002	0	y	104.981	144.886	21.026	21.026	2.139	H1-1b*
10	1	M12	HSS5X5X5	0.02	5.839	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b
11	1	M13	HSS5X5X5	0.023	11.439	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
12	1	M14	HSS5X5X5	0.016	5.595	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b
13	1	M15	HSS5X5X5	0.017	5.595	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b
14	2	M1	HSS8X8X6	0.015	15.33	0	15.33	y	226.077	286.467	67.485	67.485	1.667	H1-1b*
15	2	M2	HSS8X8X6	0	16.67	0	16.67	y	216.519	286.467	67.485	67.485	1.667	H1-1b*
16	2	M4	HSS8X8X6	0.015	15.33	0	15.33	y	226.077	286.467	67.485	67.485	1.667	H1-1b*
17	2	M5	HSS8X8X6	0	16.67	0	16.67	y	216.519	286.467	67.485	67.485	1.667	H1-1b*
18	2	M6	W14X30	0	15.67	0	15.67	y	83.318	264.97	22.43	118.014	1	H1-1b*
19	2	M10	W16X36	0.145	7.835	0.042	15.67	y	104.147	317.365	26.946	106.807	1.136	H1-1b
20	2	M7	HSS5X5X5	0	11.439	0	11.439	y	102.006	144.886	21.026	21.026	1.667	H1-1b*
21	2	M8	HSS5X5X5	0.007	10.961	0	10.961	y	104.981	144.886	21.026	21.026	1.667	H1-1b*
22	2	M9	HSS5X5X5	0	11.439	0	11.439	y	102.006	144.886	21.026	21.026	1.667	H1-1b*

AISC 15TH (360-16): ASD Member Steel Code Checks (Continued)

	LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Pnc/om [k]	Pnt/om [k]	Mnyy/om [k-ft]	Mnzz/om [k-ft]	Cb	Eqn
23	2	M11	HSS5X5X5	0.007	10.961	0	10.961	y	104.981	144.886	21.026	21.026	1.667	H1-1b*
24	2	M12	HSS5X5X5	0	11.439	0	11.439	y	102.006	144.886	21.026	21.026	1	H1-1b*
25	2	M13	HSS5X5X5	0	11.439	0	11.439	y	102.006	144.886	21.026	21.026	1	H1-1b*
26	2	M14	HSS5X5X5	0.007	10.961	0	10.961	y	104.981	144.886	21.026	21.026	1	H1-1b*
27	2	M15	HSS5X5X5	0.007	10.961	0	10.961	y	104.981	144.886	21.026	21.026	1	H1-1b*
28	3	M1	HSS8X8X6	0.052	15.33	0.005	15.33	y	226.077	286.467	67.485	67.485	2.166	H1-1b*
29	3	M2	HSS8X8X6	0.03	0	0.005	0	y	216.519	286.467	67.485	67.485	1.792	H1-1b
30	3	M4	HSS8X8X6	0.029	15.33	0.005	15.33	y	226.077	286.467	67.485	67.485	2.189	H1-1b
31	3	M5	HSS8X8X6	0.028	0	0.005	0	y	216.519	286.467	67.485	67.485	1.832	H1-1b
32	3	M6	W14X30	0.19	7.835	0.076	15.67	y	83.318	264.97	22.43	118.014	1	H1-1b
33	3	M10	W16X36	0.147	7.835	0.042	15.67	y	104.147	317.365	26.946	106.807	1.136	H1-1b
34	3	M7	HSS5X5X5	0.011	11.439	0.003	11.439	y	102.006	144.886	21.026	21.026	2.072	H1-1b
35	3	M8	HSS5X5X5	0.046	10.961	0.002	10.961	y	104.981	144.886	21.026	21.026	2.133	H1-1b*
36	3	M9	HSS5X5X5	0.011	0	0.003	0	y	102.006	144.886	21.026	21.026	2.072	H1-1b
37	3	M11	HSS5X5X5	0.048	10.961	0.002	0	y	104.981	144.886	21.026	21.026	2.133	H1-1b*
38	3	M12	HSS5X5X5	0.02	5.839	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b
39	3	M13	HSS5X5X5	0.022	11.439	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
40	3	M14	HSS5X5X5	0.013	5.595	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b
41	3	M15	HSS5X5X5	0.014	5.595	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b
42	4	M1	HSS8X8X6	0.052	15.33	0.006	15.33	y	226.077	286.467	67.485	67.485	2.17	H1-1b*
43	4	M2	HSS8X8X6	0.043	0	0.007	0	y	216.519	286.467	67.485	67.485	1.799	H1-1b
44	4	M4	HSS8X8X6	0.029	15.33	0.006	15.33	y	226.077	286.467	67.485	67.485	2.185	H1-1b
45	4	M5	HSS8X8X6	0.039	0	0.007	0	y	216.519	286.467	67.485	67.485	1.826	H1-1b
46	4	M6	W14X30	0.266	7.835	0.107	15.67	y	83.318	264.97	22.43	118.014	1	H1-1b
47	4	M10	W16X36	0.008	15.67	0	15.67	y	104.147	317.365	26.946	93.991	1	H1-1b*
48	4	M7	HSS5X5X5	0.016	11.439	0.004	11.439	y	102.006	144.886	21.026	21.026	2.082	H1-1b
49	4	M8	HSS5X5X5	0.053	10.961	0.003	10.961	y	104.981	144.886	21.026	21.026	2.139	H1-1b*
50	4	M9	HSS5X5X5	0.016	0	0.004	0	y	102.006	144.886	21.026	21.026	2.082	H1-1b
51	4	M11	HSS5X5X5	0.057	10.961	0.003	0	y	104.981	144.886	21.026	21.026	2.139	H1-1b*
52	4	M12	HSS5X5X5	0.028	5.839	0.003	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b
53	4	M13	HSS5X5X5	0.032	11.439	0.003	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
54	4	M14	HSS5X5X5	0.022	5.595	0.003	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b
55	4	M15	HSS5X5X5	0.024	5.595	0.003	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b
56	5	M1	HSS8X8X6	0.08	15.33	0.006	15.33	y	226.077	286.467	67.485	67.485	2.162	H1-1b*
57	5	M2	HSS8X8X6	0.042	16.67	0.006	0	y	216.519	286.467	67.485	67.485	1.785	H1-1b*
58	5	M4	HSS8X8X6	0.043	15.33	0.006	15.33	y	226.077	286.467	67.485	67.485	2.194	H1-1b*
59	5	M5	HSS8X8X6	0.039	0	0.006	0	y	216.519	286.467	67.485	67.485	1.84	H1-1b
60	5	M6	W14X30	0.323	7.835	0.13	15.67	y	83.318	264.97	22.43	118.014	1	H1-1b
61	5	M10	W16X36	0.235	7.835	0.067	15.67	y	104.147	317.365	26.946	106.807	1.136	H1-1b
62	5	M7	HSS5X5X5	0.016	11.439	0.003	11.439	y	102.006	144.886	21.026	21.026	2.063	H1-1b
63	5	M8	HSS5X5X5	0.063	10.961	0.003	10.961	y	104.981	144.886	21.026	21.026	2.124	H1-1b*
64	5	M9	HSS5X5X5	0.015	0	0.003	0	y	102.006	144.886	21.026	21.026	2.063	H1-1b
65	5	M11	HSS5X5X5	0.066	10.961	0.003	0	y	104.981	144.886	21.026	21.026	2.124	H1-1b*
66	5	M12	HSS5X5X5	0.028	11.439	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
67	5	M13	HSS5X5X5	0.032	11.439	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
68	5	M14	HSS5X5X5	0.013	5.595	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b
69	5	M15	HSS5X5X5	0.014	5.595	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b
70	6	M1	HSS8X8X6	0.069	15.33	0.006	15.33	y	226.077	286.467	67.485	67.485	2.165	H1-1b*
71	6	M2	HSS8X8X6	0.037	0	0.006	0	y	216.519	286.467	67.485	67.485	1.79	H1-1b
72	6	M4	HSS8X8X6	0.037	15.33	0.006	15.33	y	226.077	286.467	67.485	67.485	2.19	H1-1b
73	6	M5	HSS8X8X6	0.033	0	0.006	0	y	216.519	286.467	67.485	67.485	1.835	H1-1b
74	6	M6	W14X30	0.228	7.835	0.091	15.67	y	83.318	264.97	22.43	118.014	1	H1-1b
75	6	M10	W16X36	0.234	7.835	0.067	15.67	y	104.147	317.365	26.946	106.807	1.136	H1-1b
76	6	M7	HSS5X5X5	0.013	11.439	0.003	11.439	y	102.006	144.886	21.026	21.026	2.068	H1-1b
77	6	M8	HSS5X5X5	0.058	10.961	0.003	10.961	y	104.981	144.886	21.026	21.026	2.131	H1-1b*
78	6	M9	HSS5X5X5	0.014	0	0.003	0	y	102.006	144.886	21.026	21.026	2.068	H1-1b
79	6	M11	HSS5X5X5	0.061	10.961	0.003	0	y	104.981	144.886	21.026	21.026	2.131	H1-1b*
80	6	M12	HSS5X5X5	0.024	5.839	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b
81	6	M13	HSS5X5X5	0.027	11.439	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
82	6	M14	HSS5X5X5	0.015	5.595	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b
83	6	M15	HSS5X5X5	0.016	5.595	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b
84	7	M1	HSS8X8X6	0.087	15.33	0.006	15.33	y	226.077	286.467	67.485	67.485	2.158	H1-1b*
85	7	M2	HSS8X8X6	0.067	16.67	0.006	0	y	216.519	286.467	67.485	67.485	1.779	H1-1b*
86	7	M4	HSS8X8X6	0.05	15.33	0.006	15.33	y	226.077	286.467	67.485	67.485	2.197	H1-1b*
87	7	M5	HSS8X8X6	0.06	16.67	0.006	0	y	216.519	286.467	67.485	67.485	1.846	H1-1b*
88	7	M6	W14X30	0.532	7.835	0.213	15.67	y	83.318	264.97	22.43	118.014	1	H1-1b
89	7	M10	W16X36	0.079	7.835	0.021	15.67	y	104.147	317.365	26.946	106.807	1.136	H1-1b
90	7	M7	HSS5X5X5	0.022	11.439	0.003	11.439	y	102.006	144.886	21.026	21.026	2.062	H1-1b

AISC 15TH (360-16): ASD Member Steel Code Checks (Continued)

	LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Pnc/om [k]	Pnt/om [k]	Mnyy/om [k-ft]	Mnzz/om [k-ft]	Cb	Eqn	
	91	7	M8	HSS5X5X5	0.065	10.961	0.003	10.961	y	104.981	144.886	21.026	21.026	2.114	H1-1b*
	92	7	M9	HSS5X5X5	0.021	0	0.003	0	y	102.006	144.886	21.026	21.026	2.062	H1-1b
	93	7	M11	HSS5X5X5	0.069	10.961	0.003	0	y	104.981	144.886	21.026	21.026	2.114	H1-1b*
	94	7	M12	HSS5X5X5	0.039	11.439	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
	95	7	M13	HSS5X5X5	0.044	11.439	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
	96	7	M14	HSS5X5X5	0.012	5.595	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b
	97	7	M15	HSS5X5X5	0.013	5.595	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b
	98	8	M1	HSS8X8X6	0.031	15.33	0.005	15.33	y	226.077	286.467	67.485	67.485	2.118	H1-1b
	99	8	M2	HSS8X8X6	0.048	16.67	0.006	0	y	216.519	286.467	67.485	67.485	1.711	H1-1b*
	100	8	M4	HSS8X8X6	0.1	15.33	0.006	15.33	y	226.077	286.467	67.485	67.485	2.157	H1-1b*
	101	8	M5	HSS8X8X6	0.076	16.67	0.006	0	y	216.519	286.467	67.485	67.485	1.777	H1-1b*
	102	8	M6	W14X30	0.535	7.835	0.213	15.67	y	83.318	264.97	22.43	118.014	1	H1-1b
	103	8	M10	W16X36	0.009	15.67	0	15.67	y	104.147	317.365	26.946	93.991	1	H1-1b*
	104	8	M7	HSS5X5X5	0.075	0	0.003	11.439	y	102.006	144.886	21.026	21.026	1.892	H1-1b*
	105	8	M8	HSS5X5X5	0.014	10.961	0.003	10.961	y	104.981	144.886	21.026	21.026	1.675	H1-1b
	106	8	M9	HSS5X5X5	0.072	0	0.003	0	y	102.006	144.886	21.026	21.026	1.892	H1-1b*
	107	8	M11	HSS5X5X5	0.013	0	0.003	0	y	104.981	144.886	21.026	21.026	1.675	H1-1b
	108	8	M12	HSS5X5X5	0.016	5.601	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b
	109	8	M13	HSS5X5X5	0.014	5.601	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b
	110	8	M14	HSS5X5X5	0.072	0	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b*
	111	8	M15	HSS5X5X5	0.068	0	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b*
	112	9	M1	HSS8X8X6	0.138	15.33	0.006	15.33	y	226.077	286.467	67.485	67.485	2.201	H1-1b*
	113	9	M2	HSS8X8X6	0.086	16.67	0.006	0	y	216.519	286.467	67.485	67.485	1.853	H1-1b*
	114	9	M4	HSS8X8X6	0.028	15.33	0.006	15.33	y	226.077	286.467	67.485	67.485	2.233	H1-1b
	115	9	M5	HSS8X8X6	0.044	16.67	0.006	0	y	216.519	286.467	67.485	67.485	1.91	H1-1b*
	116	9	M6	W14X30	0.538	7.835	0.213	15.67	y	83.318	264.97	22.43	118.014	1	H1-1b
	117	9	M10	W16X36	0.019	15.67	0	15.67	y	104.147	317.365	26.946	93.991	1	H1-1b*
	118	9	M7	HSS5X5X5	0.027	11.439	0.003	11.439	y	102.006	144.886	21.026	21.026	2.159	H1-1b*
	119	9	M8	HSS5X5X5	0.134	10.961	0.003	10.961	y	104.981	144.886	21.026	21.026	2.337	H1-1b*
	120	9	M9	HSS5X5X5	0.03	11.439	0.003	0	y	102.006	144.886	21.026	21.026	2.159	H1-1b*
	121	9	M11	HSS5X5X5	0.138	10.961	0.003	0	y	104.981	144.886	21.026	21.026	2.337	H1-1b*
	122	9	M12	HSS5X5X5	0.085	11.439	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
	123	9	M13	HSS5X5X5	0.09	11.439	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
	124	9	M14	HSS5X5X5	0.059	10.961	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b*
	125	9	M15	HSS5X5X5	0.062	10.961	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b*
	126	10	M1	HSS8X8X6	0.026	15.33	0.005	15.33	y	226.077	286.467	67.485	67.485	2.128	H1-1b
	127	10	M2	HSS8X8X6	0.026	0	0.006	0	y	216.519	286.467	67.485	67.485	1.728	H1-1b
	128	10	M4	HSS8X8X6	0.065	15.33	0.006	15.33	y	226.077	286.467	67.485	67.485	2.147	H1-1b*
	129	10	M5	HSS8X8X6	0.041	0	0.006	0	y	216.519	286.467	67.485	67.485	1.76	H1-1b
	130	10	M6	W14X30	0.24	7.835	0.091	15.67	y	83.318	264.97	22.43	118.014	1	H1-1b
	131	10	M10	W16X36	0.002	15.67	0	15.67	y	104.147	317.365	26.946	93.991	1	H1-1b*
	132	10	M7	HSS5X5X5	0.059	0	0.003	11.439	y	102.006	144.886	21.026	21.026	1.907	H1-1b*
	133	10	M8	HSS5X5X5	0.021	0	0.003	10.961	y	104.981	144.886	21.026	21.026	1.719	H1-1b*
	134	10	M9	HSS5X5X5	0.055	0	0.003	0	y	102.006	144.886	21.026	21.026	1.907	H1-1b*
	135	10	M11	HSS5X5X5	0.018	0	0.003	0	y	104.981	144.886	21.026	21.026	1.719	H1-1b*
	136	10	M12	HSS5X5X5	0.021	5.601	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b
	137	10	M13	HSS5X5X5	0.02	5.601	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b
	138	10	M14	HSS5X5X5	0.056	0	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b*
	139	10	M15	HSS5X5X5	0.052	0	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b*
	140	11	M1	HSS8X8X6	0.103	15.33	0.006	15.33	y	226.077	286.467	67.485	67.485	2.211	H1-1b*
	141	11	M2	HSS8X8X6	0.05	16.67	0.006	0	y	216.519	286.467	67.485	67.485	1.871	H1-1b*
	142	11	M4	HSS8X8X6	0.041	15.33	0.006	15.33	y	226.077	286.467	67.485	67.485	2.223	H1-1b
	143	11	M5	HSS8X8X6	0.026	0	0.006	0	y	216.519	286.467	67.485	67.485	1.892	H1-1b
	144	11	M6	W14X30	0.234	7.835	0.091	15.67	y	83.318	264.97	22.43	118.014	1	H1-1b
	145	11	M10	W16X36	0.012	15.67	0	15.67	y	104.147	317.365	26.946	93.991	1	H1-1b*
	146	11	M7	HSS5X5X5	0.038	11.439	0.003	11.439	y	102.006	144.886	21.026	21.026	2.166	H1-1b*
	147	11	M8	HSS5X5X5	0.119	10.961	0.003	10.961	y	104.981	144.886	21.026	21.026	2.357	H1-1b*
	148	11	M9	HSS5X5X5	0.041	11.439	0.003	0	y	102.006	144.886	21.026	21.026	2.166	H1-1b*
	149	11	M11	HSS5X5X5	0.122	10.961	0.003	0	y	104.981	144.886	21.026	21.026	2.357	H1-1b*
	150	11	M12	HSS5X5X5	0.069	11.439	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
	151	11	M13	HSS5X5X5	0.073	11.439	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
	152	11	M14	HSS5X5X5	0.071	10.961	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b*
	153	11	M15	HSS5X5X5	0.074	10.961	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b*
	154	12	M1	HSS8X8X6	0.042	15.33	0.005	15.33	y	226.077	286.467	67.485	67.485	2.078	H1-1b*
	155	12	M2	HSS8X8X6	0.022	0	0.006	0	y	216.519	286.467	67.485	67.485	1.651	H1-1b
	156	12	M4	HSS8X8X6	0.14	15.33	0.005	15.33	y	226.077	286.467	67.485	67.485	2.113	H1-1b*
	157	12	M5	HSS8X8X6	0.067	16.67	0.006	0	y	216.519	286.467	67.485	67.485	1.704	H1-1b*
	158	12	M6	W14X30	0.352	7.835	0.13	15.67	y	83.318	264.97	22.43	118.014	1	H1-1b

AISC 15TH (360-16): ASD Member Steel Code Checks (Continued)

	LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Pnc/om [k]	Pnt/om [k]	Mnyy/om [k-ft]	Mnzz/om [k-ft]	Cb	Eqn
159	12	M10	W16X36	0.073	7.672	0.021	15.67	y	104.147	317.365	26.946	106.807	1.136	H1-1b
160	12	M7	HSS5X5X5	0.12	0	0.003	11.439	y	102.006	144.886	21.026	21.026	1.731	H1-1b*
161	12	M8	HSS5X5X5	0.067	0	0.003	10.961	y	104.981	144.886	21.026	21.026	1.279	H1-1b*
162	12	M9	HSS5X5X5	0.116	0	0.003	0	y	102.006	144.886	21.026	21.026	1.731	H1-1b*
163	12	M11	HSS5X5X5	0.065	0	0.003	0	y	104.981	144.886	21.026	21.026	1.279	H1-1b*
164	12	M12	HSS5X5X5	0.046	0	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
165	12	M13	HSS5X5X5	0.043	0	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
166	12	M14	HSS5X5X5	0.14	0	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b*
167	12	M15	HSS5X5X5	0.137	0	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b*
168	13	M1	HSS8X8X6	0.179	15.33	0.006	15.33	y	226.077	286.467	67.485	67.485	2.246	H1-1b*
169	13	M2	HSS8X8X6	0.08	16.67	0.006	0	y	216.519	286.467	67.485	67.485	1.936	H1-1b*
170	13	M4	HSS8X8X6	0.069	15.33	0.006	15.33	y	226.077	286.467	67.485	67.485	2.264	H1-1b*
171	13	M5	HSS8X8X6	0.025	0	0.006	0	y	216.519	286.467	67.485	67.485	1.969	H1-1b
172	13	M6	W14X30	0.335	7.835	0.13	15.67	y	83.318	264.97	22.43	118.014	1	H1-1b
173	13	M10	W16X36	0.081	7.835	0.021	15.67	y	104.147	317.365	26.946	106.807	1.136	H1-1b
174	13	M7	HSS5X5X5	0.074	11.439	0.003	11.439	y	102.006	144.886	21.026	21.026	2.242	H1-1b*
175	13	M8	HSS5X5X5	0.2	10.961	0.003	10.961	y	104.981	144.886	21.026	21.026	2.546	H1-1b*
176	13	M9	HSS5X5X5	0.077	11.439	0.003	0	y	102.006	144.886	21.026	21.026	2.242	H1-1b*
177	13	M11	HSS5X5X5	0.216	0	0.003	0	y	104.981	144.886	21.026	21.026	2.546	H1-1a
178	13	M12	HSS5X5X5	0.119	11.439	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
179	13	M13	HSS5X5X5	0.124	11.439	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
180	13	M14	HSS5X5X5	0.12	10.961	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b*
181	13	M15	HSS5X5X5	0.122	10.961	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b*
182	14	M1	HSS8X8X6	0.05	15.33	0.005	15.33	y	226.077	286.467	67.485	67.485	2.084	H1-1b*
183	14	M2	HSS8X8X6	0.023	0	0.006	0	y	216.519	286.467	67.485	67.485	1.656	H1-1b
184	14	M4	HSS8X8X6	0.129	15.33	0.005	15.33	y	226.077	286.467	67.485	67.485	2.11	H1-1b*
185	14	M5	HSS8X8X6	0.055	16.67	0.006	0	y	216.519	286.467	67.485	67.485	1.699	H1-1b*
186	14	M6	W14X30	0.26	7.835	0.091	15.67	y	83.318	264.97	22.43	118.014	1	H1-1b
187	14	M10	W16X36	0.077	7.672	0.021	15.67	y	104.147	317.365	26.946	106.807	1.136	H1-1b
188	14	M7	HSS5X5X5	0.115	0	0.003	11.439	y	102.006	144.886	21.026	21.026	1.736	H1-1b*
189	14	M8	HSS5X5X5	0.071	0	0.003	10.961	y	104.981	144.886	21.026	21.026	1.291	H1-1b*
190	14	M9	HSS5X5X5	0.111	0	0.003	0	y	102.006	144.886	21.026	21.026	1.736	H1-1b*
191	14	M11	HSS5X5X5	0.068	0	0.003	0	y	104.981	144.886	21.026	21.026	1.291	H1-1b*
192	14	M12	HSS5X5X5	0.049	0	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
193	14	M13	HSS5X5X5	0.046	0	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
194	14	M14	HSS5X5X5	0.135	0	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b*
195	14	M15	HSS5X5X5	0.132	0	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b*
196	15	M1	HSS8X8X6	0.168	15.33	0.006	15.33	y	226.077	286.467	67.485	67.485	2.249	H1-1b*
197	15	M2	HSS8X8X6	0.069	16.67	0.006	0	y	216.519	286.467	67.485	67.485	1.941	H1-1b*
198	15	M4	HSS8X8X6	0.078	15.33	0.006	15.33	y	226.077	286.467	67.485	67.485	2.261	H1-1b*
199	15	M5	HSS8X8X6	0.025	0	0.006	0	y	216.519	286.467	67.485	67.485	1.963	H1-1b
200	15	M6	W14X30	0.24	7.835	0.091	15.67	y	83.318	264.97	22.43	118.014	1	H1-1b
201	15	M10	W16X36	0.08	7.835	0.021	15.67	y	104.147	317.365	26.946	106.807	1.136	H1-1b
202	15	M7	HSS5X5X5	0.078	11.439	0.003	11.439	y	102.006	144.886	21.026	21.026	2.244	H1-1b*
203	15	M8	HSS5X5X5	0.195	10.961	0.003	10.961	y	104.981	144.886	21.026	21.026	2.551	H1-1b*
204	15	M9	HSS5X5X5	0.081	11.439	0.003	0	y	102.006	144.886	21.026	21.026	2.244	H1-1b*
205	15	M11	HSS5X5X5	0.198	10.961	0.003	0	y	104.981	144.886	21.026	21.026	2.551	H1-1b*
206	15	M12	HSS5X5X5	0.114	11.439	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
207	15	M13	HSS5X5X5	0.119	11.439	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
208	15	M14	HSS5X5X5	0.123	10.961	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b*
209	15	M15	HSS5X5X5	0.126	10.961	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b*
210	16	M1	HSS8X8X6	0.065	15.33	0.004	15.33	y	226.077	286.467	67.485	67.485	2.028	H1-1b*
211	16	M2	HSS8X8X6	0.02	0	0.004	0	y	216.519	286.467	67.485	67.485	1.614	H1-1b
212	16	M4	HSS8X8X6	0.12	15.33	0.004	15.33	y	226.077	286.467	67.485	67.485	2.081	H1-1b*
213	16	M5	HSS8X8X6	0.049	16.67	0.004	0	y	216.519	286.467	67.485	67.485	1.654	H1-1b*
214	16	M6	W14X30	0.204	7.835	0.069	15.67	y	83.318	264.97	22.43	118.014	1	H1-1b
215	16	M10	W16X36	0.019	0	0	15.67	y	104.147	317.365	26.946	93.991	1	H1-1b*
216	16	M7	HSS5X5X5	0.114	0	0.002	11.439	y	102.006	144.886	21.026	21.026	1.633	H1-1b*
217	16	M8	HSS5X5X5	0.081	0	0.002	10.961	y	104.981	144.886	21.026	21.026	1.232	H1-1b*
218	16	M9	HSS5X5X5	0.111	0	0.002	0	y	102.006	144.886	21.026	21.026	1.633	H1-1b*
219	16	M11	HSS5X5X5	0.08	0	0.002	0	y	104.981	144.886	21.026	21.026	1.232	H1-1b*
220	16	M12	HSS5X5X5	0.053	0	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
221	16	M13	HSS5X5X5	0.051	0	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
222	16	M14	HSS5X5X5	0.137	0	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b*
223	16	M15	HSS5X5X5	0.134	0	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b*
224	17	M1	HSS8X8X6	0.15	15.33	0.004	15.33	y	226.077	286.467	67.485	67.485	2.277	H1-1b*
225	17	M2	HSS8X8X6	0.061	16.67	0.004	0	y	216.519	286.467	67.485	67.485	1.994	H1-1b*
226	17	M4	HSS8X8X6	0.085	15.33	0.004	15.33	y	226.077	286.467	67.485	67.485	2.283	H1-1b*

AISC 15TH (360-16): ASD Member Steel Code Checks (Continued)

LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Pnc/om [k]	Pnt/om [k]	Mnyy/om [k-ft]	Mnzz/om [k-ft]	Cb	Eqn	
227	17	M5	HSS8X8X6	0.022	0	0.004	0	y	216.519	286.467	67.485	67.485	2.006	H1-1b
228	17	M6	W14X30	0.183	7.835	0.069	15.67	y	83.318	264.97	22.43	118.014	1	H1-1b
229	17	M10	W16X36	0.015	15.67	0	15.67	y	104.147	317.365	26.946	93.991	1	H1-1b*
230	17	M7	HSS5X5X5	0.078	11.439	0.002	11.439	y	102.006	144.886	21.026	21.026	2.297	H1-1b*
231	17	M8	HSS5X5X5	0.18	10.961	0.002	10.961	y	104.981	144.886	21.026	21.026	2.673	H1-1b*
232	17	M9	HSS5X5X5	0.08	11.439	0.002	0	y	102.006	144.886	21.026	21.026	2.297	H1-1b*
233	17	M11	HSS5X5X5	0.182	10.961	0.002	0	y	104.981	144.886	21.026	21.026	2.673	H1-1b*
234	17	M12	HSS5X5X5	0.109	11.439	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
235	17	M13	HSS5X5X5	0.112	11.439	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
236	17	M14	HSS5X5X5	0.122	10.961	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b*
237	17	M15	HSS5X5X5	0.124	10.961	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b*
238	18	M1	HSS8X8X6	0.037	15.33	0.005	15.33	y	226.077	286.467	67.485	67.485	2.17	H1-1b*
239	18	M2	HSS8X8X6	0.03	0	0.005	0	y	216.519	286.467	67.485	67.485	1.799	H1-1b
240	18	M4	HSS8X8X6	0.021	15.33	0.005	15.33	y	226.077	286.467	67.485	67.485	2.185	H1-1b
241	18	M5	HSS8X8X6	0.028	0	0.005	0	y	216.519	286.467	67.485	67.485	1.826	H1-1b
242	18	M6	W14X30	0.19	7.835	0.076	15.67	y	83.318	264.97	22.43	118.014	1	H1-1b
243	18	M10	W16X36	0.006	15.67	0	15.67	y	104.147	317.365	26.946	93.991	1	H1-1b*
244	18	M7	HSS5X5X5	0.011	11.439	0.003	11.439	y	102.006	144.886	21.026	21.026	2.082	H1-1b
245	18	M8	HSS5X5X5	0.038	10.961	0.002	10.961	y	104.981	144.886	21.026	21.026	2.139	H1-1b*
246	18	M9	HSS5X5X5	0.011	0	0.003	0	y	102.006	144.886	21.026	21.026	2.082	H1-1b
247	18	M11	HSS5X5X5	0.041	10.961	0.002	0	y	104.981	144.886	21.026	21.026	2.139	H1-1b*
248	18	M12	HSS5X5X5	0.02	5.839	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b
249	18	M13	HSS5X5X5	0.023	11.439	0.002	11.439	y	102.006	144.886	21.026	21.026	1.136	H1-1b*
250	18	M14	HSS5X5X5	0.016	5.595	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b
251	18	M15	HSS5X5X5	0.017	5.595	0.002	10.961	y	104.981	144.886	21.026	21.026	1.136	H1-1b
252	19	M1	HSS8X8X6	0.015	15.33	0	15.33	y	226.077	286.467	67.485	67.485	1.667	H1-1b*
253	19	M2	HSS8X8X6	0	16.67	0	16.67	y	216.519	286.467	67.485	67.485	1.667	H1-1b*
254	19	M4	HSS8X8X6	0.015	15.33	0	15.33	y	226.077	286.467	67.485	67.485	1.667	H1-1b*
255	19	M5	HSS8X8X6	0	16.67	0	16.67	y	216.519	286.467	67.485	67.485	1.667	H1-1b*
256	19	M6	W14X30	0	15.67	0	15.67	y	83.318	264.97	22.43	118.014	1	H1-1b*
257	19	M10	W16X36	0.145	7.835	0.042	15.67	y	104.147	317.365	26.946	106.807	1.136	H1-1b
258	19	M7	HSS5X5X5	0	11.439	0	11.439	y	102.006	144.886	21.026	21.026	1.667	H1-1b*
259	19	M8	HSS5X5X5	0.007	10.961	0	10.961	y	104.981	144.886	21.026	21.026	1.667	H1-1b*
260	19	M9	HSS5X5X5	0	11.439	0	11.439	y	102.006	144.886	21.026	21.026	1.667	H1-1b*
261	19	M11	HSS5X5X5	0.007	10.961	0	10.961	y	104.981	144.886	21.026	21.026	1.667	H1-1b*
262	19	M12	HSS5X5X5	0	11.439	0	11.439	y	102.006	144.886	21.026	21.026	1	H1-1b*
263	19	M13	HSS5X5X5	0	11.439	0	11.439	y	102.006	144.886	21.026	21.026	1	H1-1b*
264	19	M14	HSS5X5X5	0.007	10.961	0	10.961	y	104.981	144.886	21.026	21.026	1	H1-1b*
265	19	M15	HSS5X5X5	0.007	10.961	0	10.961	y	104.981	144.886	21.026	21.026	1	H1-1b*
266	20	M1	HSS8X8X6	0.022	15.33	0	15.33	y	226.077	286.467	67.485	67.485	1.667	H1-1b*
267	20	M2	HSS8X8X6	0.023	16.67	0	16.67	y	216.519	286.467	67.485	67.485	1.667	H1-1b*
268	20	M4	HSS8X8X6	0.022	15.33	0	15.33	y	226.077	286.467	67.485	67.485	1.667	H1-1b*
269	20	M5	HSS8X8X6	0.023	16.67	0	16.67	y	216.519	286.467	67.485	67.485	1.667	H1-1b*
270	20	M6	W14X30	0.19	7.835	0.076	15.67	y	83.318	264.97	22.43	118.014	1	H1-1b
271	20	M10	W16X36	0.005	15.67	0	15.67	y	104.147	317.365	26.946	93.991	1	H1-1b*
272	20	M7	HSS5X5X5	0.01	11.439	0	11.439	y	102.006	144.886	21.026	21.026	1.667	H1-1b*
273	20	M8	HSS5X5X5	0.01	10.961	0	10.961	y	104.981	144.886	21.026	21.026	1.667	H1-1b*
274	20	M9	HSS5X5X5	0.01	11.439	0	11.439	y	102.006	144.886	21.026	21.026	1.667	H1-1b*
275	20	M11	HSS5X5X5	0.01	10.961	0	10.961	y	104.981	144.886	21.026	21.026	1.667	H1-1b*
276	20	M12	HSS5X5X5	0.01	11.439	0	11.439	y	102.006	144.886	21.026	21.026	1	H1-1b*
277	20	M13	HSS5X5X5	0.01	11.439	0	11.439	y	102.006	144.886	21.026	21.026	1	H1-1b*
278	20	M14	HSS5X5X5	0.01	10.961	0	10.961	y	104.981	144.886	21.026	21.026	1	H1-1b*
279	20	M15	HSS5X5X5	0.01	10.961	0	10.961	y	104.981	144.886	21.026	21.026	1	H1-1b*
280	21	M1	HSS8X8X6	0.092	15.33	0	15.33	y	226.077	286.467	67.485	67.485	1.667	H1-1b*
281	21	M2	HSS8X8X6	0.029	16.67	0	16.67	y	216.519	286.467	67.485	67.485	1.667	H1-1b*
282	21	M4	HSS8X8X6	0.114	15.33	0	15.33	y	226.077	286.467	67.485	67.485	1.667	H1-1b*
283	21	M5	HSS8X8X6	0.031	16.67	0	16.67	y	216.519	286.467	67.485	67.485	1.667	H1-1b*
284	21	M6	W14X30	0.077	15.67	0	15.67	y	83.318	264.97	22.43	118.014	1	H1-1b*
285	21	M10	W16X36	0.03	15.67	0	15.67	y	104.147	317.365	26.946	93.991	1	H1-1b*
286	21	M7	HSS5X5X5	0.112	11.439	0	11.439	y	102.006	144.886	21.026	21.026	1.667	H1-1b*
287	21	M8	HSS5X5X5	0.105	10.961	0	10.961	y	104.981	144.886	21.026	21.026	1.667	H1-1b*
288	21	M9	HSS5X5X5	0.112	11.439	0	11.439	y	102.006	144.886	21.026	21.026	1.667	H1-1b*
289	21	M11	HSS5X5X5	0.105	10.961	0	10.961	y	104.981	144.886	21.026	21.026	1.667	H1-1b*
290	21	M12	HSS5X5X5	0.064	11.439	0	11.439	y	102.006	144.886	21.026	21.026	1	H1-1b*
291	21	M13	HSS5X5X5	0.064	11.439	0	11.439	y	102.006	144.886	21.026	21.026	1	H1-1b*
292	21	M14	HSS5X5X5	0.152	10.961	0	10.961	y	104.981	144.886	21.026	21.026	1	H1-1b*
293	21	M15	HSS5X5X5	0.152	10.961	0	10.961	y	104.981	144.886	21.026	21.026	1	H1-1b*



Company : J&S Structural Engineers
Designer : KEJ
Job Number : 24-021
Model Name : FRAME F LS JOC

11/1/2024
4:13:21 PM
Checked By : _____

AISI S100-20: ASD Member Cold Formed Steel Code Checks

No Data to Print...

AWC NDS-18 / SDPWS-21 ASD Member Wood Code Checks

No Data to Print...

AA ADM1-20: ASD - BUILDING Member Aluminum Code Checks

No Data to Print...

AISC 14TH (360-10): ASD Member Stainless Steel Code Checks

No Data to Print...

Plate Principal Stresses

No Data to Print...

Plate Forces (per ft)

No Data to Print...

Plate Corner Forces

No Data to Print...

Solid Stresses

No Data to Print...

Solid Principal Stresses

No Data to Print...

Solid Corner Forces

No Data to Print...

Wall Panel Forces

No Data to Print...

TMS 402-16: ASD Wall Panel Masonry Code Checks (Seismic)

No Data to Print...

X-Direction Story Drift - Service

No Data to Print...

Z-Direction Story Drift - Service

No Data to Print...

X-Direction Story Drift - Strength

No Data to Print...

Z-Direction Story Drift - Strength

No Data to Print...

Envelope Node Reactions

No Data to Print...

Envelope Node Displacements

No Data to Print...

Envelope Member Section Forces

No Data to Print...

Envelope Maximum Member Section Forces

No Data to Print...

Envelope Member End Reactions

No Data to Print...

Envelope Member 2nd/1st Moment Ratios

No Data to Print...

Envelope Member Section Stresses

No Data to Print...

Envelope AISC 15th (360-16): ASD Steel Code Checks

No Data to Print...

Envelope AISI S100-20: ASD Cold Formed Steel Code Checks

No Data to Print...

Envelope Wood Code Checks

No Data to Print...

Envelope Concrete Beam Design Results

No Data to Print...

Envelope Concrete Column Design Results

No Data to Print...

Envelope AA ADM1-20: ASD - Building Aluminum Code Checks

No Data to Print...

Envelope AISC 14th (360-10): ASD Stainless Steel Code Checks

No Data to Print...

Frequencies and Participation

No Data to Print...

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [10^{-6}F^{-1}]	Density [k/ft ³]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A992	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	0.3	0.65	0.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	0.3	0.65	0.527	42	1.4	58	1.3
5	A500 Gr.B RECT	29000	11154	0.3	0.65	0.527	46	1.4	58	1.3
6	A500 Gr.C RND	29000	11154	0.3	0.65	0.527	46	1.4	62	1.3
7	A500 Gr.C RECT	29000	11154	0.3	0.65	0.527	50	1.4	62	1.3
8	A53 Gr.B	29000	11154	0.3	0.65	0.49	35	1.6	60	1.2
9	A1085	29000	11154	0.3	0.65	0.49	50	1.4	65	1.3
10	A913 Gr.65	29000	11154	0.3	0.65	0.49	65	1.1	80	1.1

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: ls joint op.ec6

LIC#: KW-06017929, Build:20.24.08.01

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC INC 1983-2023

DESCRIPTION: west Canopy Beam

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : IBC 2021

Material Properties

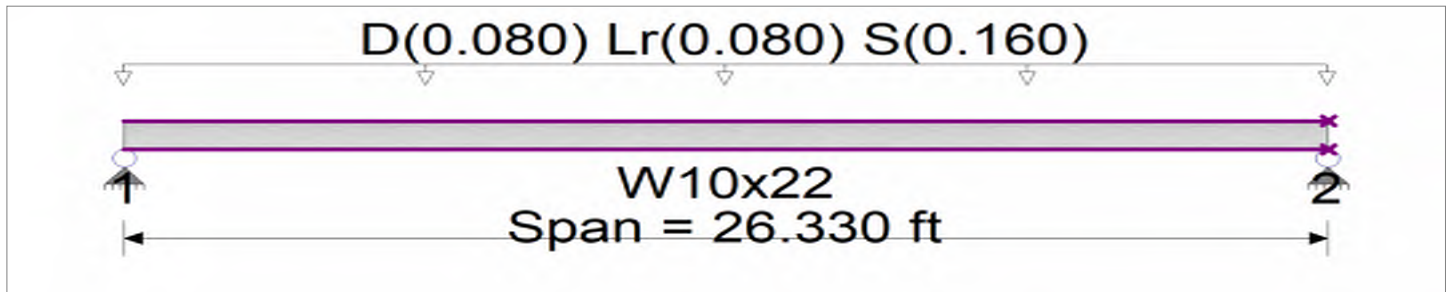
Analysis Method : Allowable Strength Design

Fy : Steel Yield : 50.0 ksi

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

E: Modulus : 29,000.0 ksi

Bending Axis : Major Axis Bending



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.020, Lr = 0.020, S = 0.040 ksf, Tributary Width = 4.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =		0.321 : 1	Maximum Shear Stress Ratio =		0.065 : 1
Section used for this span		W10x22	Section used for this span		W10x22
Ma : Applied		20.798 k-ft	Va : Applied		3.160 k
Mn / Omega : Allowable		64.870 k-ft	Vn/Omega : Allowable		48.960 k
Load Combination		+D+S	Load Combination		+D+S
Span # where maximum occurs		Span # 1	Location of maximum on span		0.000 ft
Span # where maximum occurs		Span # 1	Span # where maximum occurs		Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.507 in	Ratio =	622 >=360	Span: 1 : S Only
Max Upward Transient Deflection		0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection		0.762 in	Ratio =	415 >=180	Span: 1 : +D+S
Max Upward Total Deflection		0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values						Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx/Vnx/Omega
D Only												
Dsgn. L = 26.33 ft	1	0.107	0.022	6.93		6.93	108.33	64.87	1.00	1.00	1.05	73.44
+D+Lr												
Dsgn. L = 26.33 ft	1	0.214	0.043	13.87		13.87	108.33	64.87	1.00	1.00	2.11	73.44
+D+S												
Dsgn. L = 26.33 ft	1	0.321	0.065	20.80		20.80	108.33	64.87	1.00	1.00	3.16	73.44
+D+0.750Lr												
Dsgn. L = 26.33 ft	1	0.187	0.038	12.13		12.13	108.33	64.87	1.00	1.00	1.84	73.44
+D+0.750S												
Dsgn. L = 26.33 ft	1	0.267	0.054	17.33		17.33	108.33	64.87	1.00	1.00	2.63	73.44
+0.60D												
Dsgn. L = 26.33 ft	1	0.064	0.013	4.16		4.16	108.33	64.87	1.00	1.00	0.63	73.44

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.7619	13.240		0.0000	0.000

Vertical Reactions

Support notation : Far left is #:

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	3.160	3.160
Max Upward from Load Combinations	3.160	3.160
Max Upward from Load Cases	2.106	2.106
D Only	1.053	1.053
+D+Lr	2.106	2.106

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: ls joint op.ec6

LIC# : KW-06017929, Build:20.24.08.01

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC INC 1983-2023

DESCRIPTION: west Canopy Beam

Vertical Reactions	Support notation : Far left is #1		Values in KIPS
	Support 1	Support 2	
Load Combination			
+D+S	3.160	3.160	
+D+0.750Lr	1.843	1.843	
+D+0.750S	2.633	2.633	
+0.60D	0.632	0.632	
Lr Only	1.053	1.053	
S Only	2.106	2.106	

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: ls joint op.ec6

LIC# : KW-06017929, Build:20.24.08.01

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC INC 1983-2023

DESCRIPTION: West Canopy Beam

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : IBC 2021

Material Properties

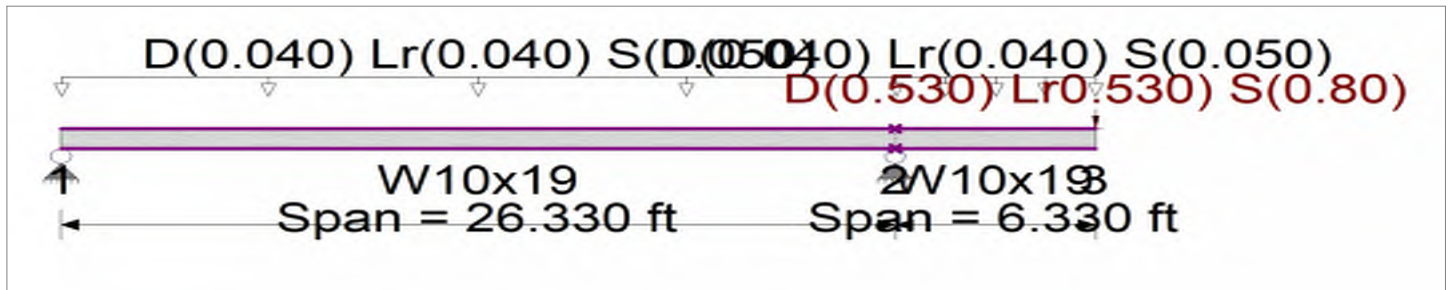
Analysis Method : Allowable Strength Design

Fy : Steel Yield : 50.0 ksi

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

E: Modulus : 29,000.0 ksi

Bending Axis : Major Axis Bending



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added

Load for Span Number 1

Uniform Load : D = 0.020, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 2.0 ft

Load for Span Number 2

Uniform Load : D = 0.020, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 2.0 ft

Point Load : D = 0.530, Lr = 0.530, S = 0.80 k @ 6.330 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =		0.190 : 1	Maximum Shear Stress Ratio =		0.037 : 1
Section used for this span		W10x19	Section used for this span		W10x19
Ma : Applied		10.222 k-ft	Va : Applied		1.90 k
Mn / Omega : Allowable		53.892 k-ft	Vn/Omega : Allowable		51.0 k
Load Combination		+D+S	Load Combination		+D+S
Span # where maximum occurs		Span # 1	Location of maximum on span		26.330 ft
			Span # where maximum occurs		Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.107 in	Ratio = 1,413	>=360	Span: 2 : S Only
Max Upward Transient Deflection		-0.013 in	Ratio = 23,604	>=360	Span: 2 : S Only
Max Downward Total Deflection		0.164 in	Ratio = 927	>=180	Span: 2 : +D+S
Max Upward Total Deflection		-0.015 in	Ratio = 21355	>=180	Span: 2 : +D+S

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 26.33 ft	1	0.077	0.015	1.70	-4.16	4.16	90.00	53.89	1.00	1.00	0.78	76.50	51.00
Dsgn. L = 6.33 ft	2	0.077	0.015		-4.16	4.16	90.00	53.89	1.00	1.00	0.78	76.50	51.00
+D+Lr													
Dsgn. L = 26.33 ft	1	0.154	0.031	3.40	-8.31	8.31	90.00	53.89	1.00	1.00	1.57	76.50	51.00
Dsgn. L = 6.33 ft	2	0.154	0.031		-8.31	8.31	90.00	53.89	1.00	1.00	1.57	76.50	51.00
+D+S													
Dsgn. L = 26.33 ft	1	0.190	0.037	3.53	-10.22	10.22	90.00	53.89	1.00	1.00	1.90	76.50	51.00
Dsgn. L = 6.33 ft	2	0.190	0.037		-10.22	10.22	90.00	53.89	1.00	1.00	1.90	76.50	51.00
+D+0.750Lr													
Dsgn. L = 26.33 ft	1	0.135	0.027	2.97	-7.27	7.27	90.00	53.89	1.00	1.00	1.37	76.50	51.00
Dsgn. L = 6.33 ft	2	0.135	0.027		-7.27	7.27	90.00	53.89	1.00	1.00	1.37	76.50	51.00
+D+0.750S													
Dsgn. L = 26.33 ft	1	0.162	0.032	3.07	-8.71	8.71	90.00	53.89	1.00	1.00	1.62	76.50	51.00
Dsgn. L = 6.33 ft	2	0.162	0.032		-8.71	8.71	90.00	53.89	1.00	1.00	1.62	76.50	51.00
+0.60D													
Dsgn. L = 26.33 ft	1	0.046	0.009	1.02	-2.49	2.49	90.00	53.89	1.00	1.00	0.47	76.50	51.00
Dsgn. L = 6.33 ft	2	0.046	0.009		-2.49	2.49	90.00	53.89	1.00	1.00	0.47	76.50	51.00

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: ls joint op.ec6

LIC# : KW-06017929, Build:20.24.08.01

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC INC 1983-2023

DESCRIPTION: West Canopy Beam

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.0962	10.321	+D+S	-0.0148	23.802
+D+S	2	0.1638	6.330		0.0000	23.802

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	0.797	3.473	
Max Upward from Load Combinations	0.797	3.473	
Max Upward from Load Cases	0.428	2.005	
D Only	0.369	1.468	
+D+Lr	0.737	2.935	
+D+S	0.797	3.473	
+D+0.750Lr	0.645	2.568	
+D+0.750S	0.690	2.971	
+0.60D	0.221	0.881	
Lr Only	0.369	1.468	
S Only	0.428	2.005	

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: ls joint op.ec6

LIC# : KW-06017929, Build:20.24.08.01

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC INC 1983-2023

DESCRIPTION: West Canopy Girder

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Strength Design

Beam Bracing : Completely Unbraced

Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi

E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added

Load for Span Number 1

Uniform Load : D = 0.020, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 16.0 ft

Load for Span Number 2

Uniform Load : D = 0.020, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 16.0 ft

Point Load : D = 1.470, Lr = 1.470, S = 2.010 k @ 8.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =		0.654 : 1	Maximum Shear Stress Ratio =		0.179 : 1
Section used for this span		W12x26	Section used for this span		W12x26
Ma : Applied		50.880 k-ft	Va : Applied		9.240 k
Mn / Omega : Allowable		77.748 k-ft	Vn/Omega : Allowable		51.630 k
Load Combination		+D+S	Load Combination		+D+S
Span # where maximum occurs		Span # 2	Location of maximum on span		8.670 ft
Span # where maximum occurs		Span # 2	Span # where maximum occurs		Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.329 in	Ratio =	583	>=360
Max Upward Transient Deflection		-0.033 in	Ratio =	3,196	>=360
Max Downward Total Deflection		0.578 in	Ratio =	332	>=180
Max Upward Total Deflection		-0.057 in	Ratio =	1824	>=180
			Span: 2 : S Only		
			Span: 2 : S Only		
			Span: 2 : +D+S		
			Span: 2 : +D+S		

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 8.67 ft	1	0.258	0.078		-22.00	22.00	142.60	85.39	1.97	1.00	4.03	77.45	51.63
Dsgn. L = 8.00 ft	2	0.283	0.078		-22.00	22.00	129.84	77.75	1.00	1.00	4.03	77.45	51.63
+D+Lr													
Dsgn. L = 8.67 ft	1	0.515	0.156		-44.00	44.00	142.60	85.39	1.97	1.00	8.06	77.45	51.63
Dsgn. L = 8.00 ft	2	0.566	0.156		-44.00	44.00	129.84	77.75	1.00	1.00	8.06	77.45	51.63
+D+S													
Dsgn. L = 8.67 ft	1	0.596	0.179		-50.88	50.88	142.60	85.39	1.96	1.00	9.24	77.45	51.63
Dsgn. L = 8.00 ft	2	0.654	0.179		-50.88	50.88	129.84	77.75	1.00	1.00	9.24	77.45	51.63
+D+0.750Lr													
Dsgn. L = 8.67 ft	1	0.451	0.137		-38.50	38.50	142.60	85.39	1.97	1.00	7.05	77.45	51.63
Dsgn. L = 8.00 ft	2	0.495	0.137		-38.50	38.50	129.84	77.75	1.00	1.00	7.05	77.45	51.63
+D+0.750S													
Dsgn. L = 8.67 ft	1	0.511	0.154		-43.66	43.66	142.60	85.39	1.96	1.00	7.94	77.45	51.63
Dsgn. L = 8.00 ft	2	0.562	0.154		-43.66	43.66	129.84	77.75	1.00	1.00	7.94	77.45	51.63
+0.60D													
Dsgn. L = 8.67 ft	1	0.155	0.047		-13.20	13.20	142.60	85.39	1.97	1.00	2.42	77.45	51.63
Dsgn. L = 8.00 ft	2	0.170	0.047		-13.20	13.20	129.84	77.75	1.00	1.00	2.42	77.45	51.63

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Beam

Project File: ls joint op.ec6

LIC# : KW-06017929, Build:20.24.08.01

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC INC 1983-2023

DESCRIPTION: West Canopy Girder

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S	-0.0570	5.202
+D+S	2	0.5783	8.000		0.0000	5.202

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions		18.230	
Max Upward from Load Combinations		18.230	
Max Upward from Load Cases		10.275	
Max Downward from all Load Conditions (Resis	-2.747		
Max Downward from Load Combinations (Resi	-2.747		
Max Downward from Load Cases (Resisting Up	-1.597		
D Only	-1.150	7.955	
+D+Lr	-2.301	15.909	
+D+S	-2.747	18.230	
+D+0.750Lr	-2.013	13.921	
+D+0.750S	-2.348	15.661	
+0.60D	-0.690	4.773	
Lr Only	-1.150	7.955	
S Only	-1.597	10.275	

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: Is joint op.ec6

LIC# : KW-06017929, Build:20.24.08.01

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC INC 1983-2023

DESCRIPTION: West Canopy Girder Grid 4

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : IBC 2021

Material Properties

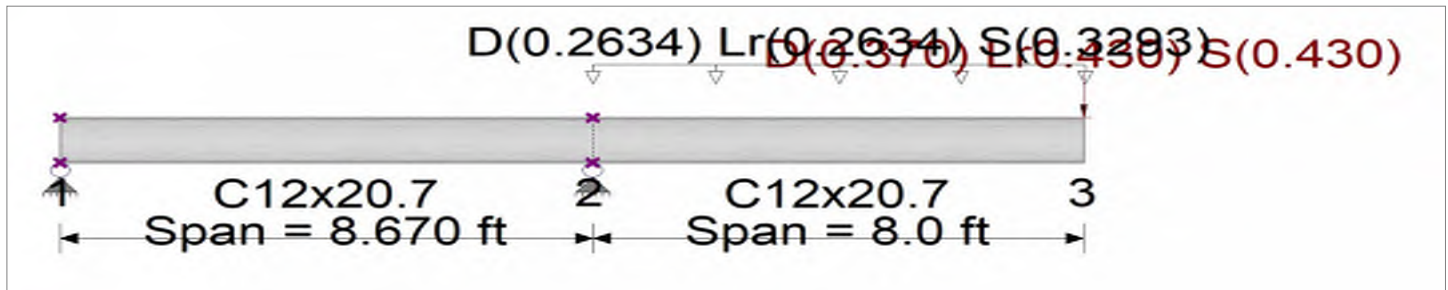
Analysis Method : Allowable Strength Design

Beam Bracing : Completely Unbraced

Bending Axis : Major Axis Bending

Fy : Steel Yield : 36.0 ksi

E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added

Load for Span Number 2

Uniform Load : D = 0.020, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 13.170 ft

Point Load : D = 0.370, Lr = 0.430, S = 0.430 k @ 8.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =		0.711 : 1	Maximum Shear Stress Ratio =		0.127 : 1
Section used for this span		C12x20.7	Section used for this span		C12x20.7
Ma : Applied		25.365 k-ft	Va : Applied		5.541 k
Mn / Omega : Allowable		35.671 k-ft	Vn/Omega : Allowable		43.769 k
Load Combination		+D+S	Load Combination		+D+S
			Location of maximum on span		8.670 ft
Span # where maximum occurs		Span # 2	Span # where maximum occurs		Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.261 in	Ratio =	736	>=360
Max Upward Transient Deflection		-0.031 in	Ratio =	3,324	>=360
Max Downward Total Deflection		0.474 in	Ratio =	405	>=180
Max Upward Total Deflection		-0.057 in	Ratio =	1832	>=180
			Span: 2 : S Only		
			Span: 2 : S Only		
			Span: 2 : +D+S		
			Span: 2 : +D+S		

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 8.67 ft	1	0.248	0.057		-11.39	11.39	76.80	45.99	1.67	1.00	2.48	73.09	43.77
Dsgn. L = 8.00 ft	2	0.319	0.057		-11.39	11.39	59.57	35.67	1.00	1.00	2.48	73.09	43.77
+D+Lr													
Dsgn. L = 8.67 ft	1	0.506	0.115		-23.26	23.26	76.80	45.99	1.67	1.00	5.01	73.09	43.77
Dsgn. L = 8.00 ft	2	0.652	0.115		-23.26	23.26	59.57	35.67	1.00	1.00	5.01	73.09	43.77
+D+S													
Dsgn. L = 8.67 ft	1	0.552	0.127		-25.36	25.36	76.80	45.99	1.67	1.00	5.54	73.09	43.77
Dsgn. L = 8.00 ft	2	0.711	0.127		-25.36	25.36	59.57	35.67	1.00	1.00	5.54	73.09	43.77
+D+0.750Lr													
Dsgn. L = 8.67 ft	1	0.441	0.100		-20.29	20.29	76.80	45.99	1.67	1.00	4.38	73.09	43.77
Dsgn. L = 8.00 ft	2	0.569	0.100		-20.29	20.29	59.57	35.67	1.00	1.00	4.38	73.09	43.77
+D+0.750S													
Dsgn. L = 8.67 ft	1	0.476	0.109		-21.87	21.87	76.80	45.99	1.67	1.00	4.78	73.09	43.77
Dsgn. L = 8.00 ft	2	0.613	0.109		-21.87	21.87	59.57	35.67	1.00	1.00	4.78	73.09	43.77
+0.60D													
Dsgn. L = 8.67 ft	1	0.149	0.034		-6.83	6.83	76.80	45.99	1.67	1.00	1.49	73.09	43.77
Dsgn. L = 8.00 ft	2	0.192	0.034		-6.83	6.83	59.57	35.67	1.00	1.00	1.49	73.09	43.77

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S	-0.0568	5.029

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: ls joint op.ec6

LIC# : KW-06017929, Build:20.24.08.01

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC INC 1983-2023

DESCRIPTION: West Canopy Girder Grid 4

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	2	0.4735	8.000		0.0000	5.029

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions		8.467	
Max Upward from Load Combinations		8.467	
Max Upward from Load Cases		4.676	
Max Downward from all Load Conditions (Resis	-2.926		
Max Downward from Load Combinations (Resi	-2.926		
Max Downward from Load Cases (Resisting Up	-1.612		
D Only	-1.314	3.791	
+D+Lr	-2.683	7.697	
+D+S	-2.926	8.467	
+D+0.750Lr	-2.340	6.720	
+D+0.750S	-2.523	7.298	
+0.60D	-0.788	2.274	
Lr Only	-1.369	3.906	
S Only	-1.612	4.676	

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: ls joint op.ec6

LIC# : KW-06017929, Build:20.24.08.01

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC INC 1983-2023

DESCRIPTION: Wind beam near B&K

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : IBC 2021

Material Properties

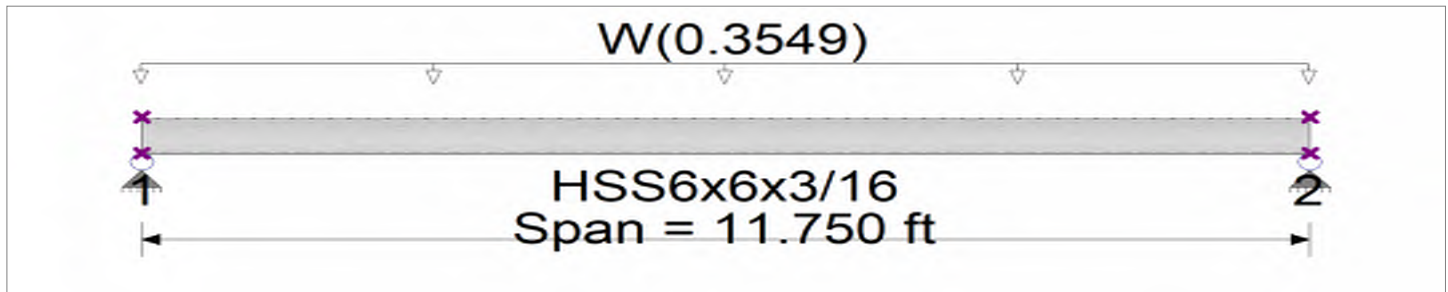
Analysis Method : Allowable Strength Design

Beam Bracing : Completely Unbraced

Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi

E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added

Uniform Load : $W = 0.030$ ksf, Tributary Width = 11.830 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	: 1	Maximum Shear Stress Ratio =	: 1
Section used for this span		Section used for this span	
Ma : Applied	k-ft	Va : Applied	k
Mn / Omega : Allowable	k-ft	Vn/Omega : Allowable	k
Load Combination		Load Combination	
Span # where maximum occurs		Location of maximum on span	ft
Span # where maximum occurs		Span # where maximum occurs	
Maximum Deflection			
Max Downward Transient Deflection	in	Ratio =	<360
Max Upward Transient Deflection	in	Ratio =	<360
Max Downward Total Deflection	in	Ratio =	<180
Max Upward Total Deflection	in	Ratio =	<180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values	
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	VnxVnx/Omega

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: ls joint op.ec6

LIC# : KW-06017929, Build:20.24.08.01

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC INC 1983-2023

DESCRIPTION: Wind beam near K

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : IBC 2021

Material Properties

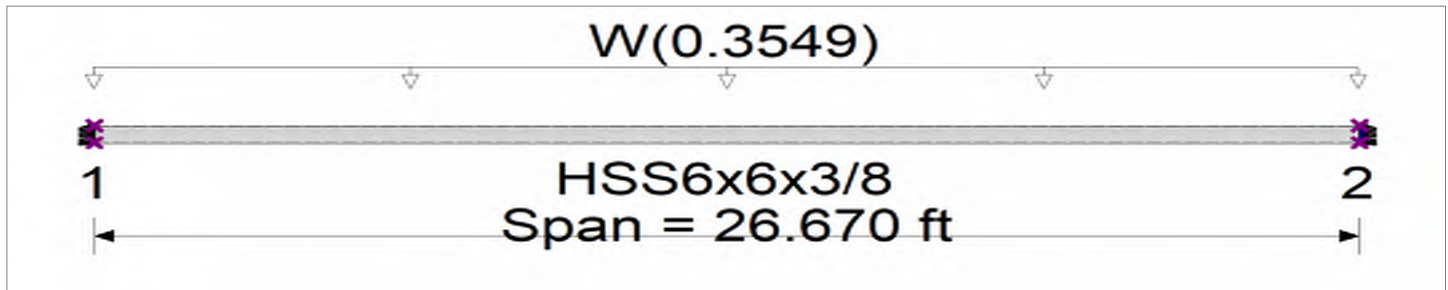
Analysis Method : Allowable Strength Design

Beam Bracing : Completely Unbraced

Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi

E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added

Uniform Load : W = 0.030 ksf, Tributary Width = 11.830 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =		0.348 : 1		Maximum Shear Stress Ratio =		0.050 : 1	
Section used for this span		HSS6x6x3/8		Section used for this span		HSS6x6x3/8	
Ma : Applied		12.622 k-ft		Va : Applied		2.840 k	
Mn / Omega : Allowable		36.267 k-ft		Vn/Omega : Allowable		57.137 k	
Load Combination		+0.60W		Load Combination		+0.60W	
Span # where maximum occurs		Span # 1		Location of maximum on span		0.000 ft	
Span # where maximum occurs		Span # 1		Span # where maximum occurs		Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.705 in Ratio =		453 >=360		Span: 1 : W Only	
Max Upward Transient Deflection		0 in Ratio =		0 <360		n/a	
Max Downward Total Deflection		0.423 in Ratio =		756 >=180		Span: 1 : +0.60W	
Max Upward Total Deflection		0 in Ratio =		0 <180		n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 26.67 ft	1		0.000				60.57	36.27	1.00	1.00	-0.00	95.42	57.14
+0.60W													
Dsgn. L = 26.67 ft	1	0.348	0.050	6.31	-12.62	12.62	60.57	36.27	2.38	1.00	2.84	95.42	57.14
+0.450W													
Dsgn. L = 26.67 ft	1	0.261	0.037	4.73	-9.47	9.47	60.57	36.27	2.38	1.00	2.13	95.42	57.14

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
W Only	1	0.7054	13.411		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	4.733	4.733
Max Upward from Load Combinations	2.840	2.840
Max Upward from Load Cases	4.733	4.733
+0.60W	2.840	2.840
+0.450W	2.130	2.130
W Only	4.733	4.733

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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Code Reference:

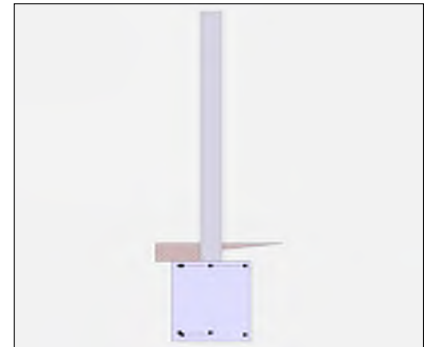
Calculations per IBC 2018 1807.3, CBC 2019, SDPWS 2015

Criteria

Retained Height	=	0.67 ft
Wall height above soil	=	8.67 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	8.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	12,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	20.0 psf (Strength Level)

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

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Design Summary

Wall Stability Ratios

Overtuning	=	2.01	OK
Sliding	=	6.70	OK
Global Stability	=	5.91	

Total Bearing Load	=	1,906 lbs	
...resultant ecc.	=	7.47 in	

Eccentricity outside middle third

Soil Pressure @ Toe	=	1,913 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	12,000 psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	2,678 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	3.2 psi	OK
Footing Shear @ Heel	=	1.3 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	339.7 lbs	
less 100% Passive Force	=	1,555.6 lbs	
less 100% Friction Force	=	720.6 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS
NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

ft =	Stem OK		
0.00			
Wall Material Above "Ht"	=	Masonry	
Design Method	=	ASD	SD SD
Thickness	=	8.00	
Rebar Size	=	# 5	
Rebar Spacing	=	32.00	
Rebar Placed at	=	Center	

Design Data

fb/FB + fa/Fa	=	0.780	

Total Force @ Section

Service Level	lbs =	111.9	
Strength Level	lbs =		

Moment....Actual

Service Level	ft-# =	522.5	
Strength Level	ft-# =		

Moment.....Allowable	=	669.7	

Shear.....Actual

Service Level	psi =	4.7	
Strength Level	psi =		

Shear.....Allowable	psi =	46.6	

Anet (Masonry)	in2 =	23.77	

Wall Weight	psf =	58.0	

Rebar Depth 'd'	in =	3.81	

Masonry Data

f'm	psi =	1,500	
Fs	psi =	20,000	
Solid Grouting	=	No	
Modular Ratio 'n'	=	21.48	
Equiv. Solid Thick.	in =	4.48	
Masonry Block Type	=		
Masonry Design Method	=	ASD	

Concrete Data

f'c	psi =		
Fy	psi =		

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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Footing Data

Toe Width	=	0.92 ft
Heel Width	=	1.58
Total Footing Width	=	2.50
Footing Thickness	=	36.00 in

f'c =	3,000 psi	Fy =	60,000 psi
Footing Concrete Density	=	150.00 pcf	
Min. As %	=	0.0018	
Cover @ Top	2.00	@ Btm.=	3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>	
Factored Pressure	=	2,678	0	psf
Mu' : Upward	=	943	6	ft-#
Mu' : Downward	=	360	360	ft-#
Mu: Design	=	583	354	ft-#
ϕ Mn	=	86,331	89,031	ft-#
Actual 1-Way Shear	=	3.22	1.27	psi
Allow 1-Way Shear	=	82.16	82.16	psi
Toe Reinforcing	=	# 7 @ 12.00 in		
Heel Reinforcing	=	# 7 @ 12.00 in		
Key Reinforcing	=	None Spec'd		
Footing Torsion, Tu	=		0.00	ft-lbs
Footing Allow. Torsion, ϕ Tn	=		0.00	ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 3.08 in, #5@ 4.78 in, #6@ 6.79 in, #7@ 9.25 in, #8@ 12.19 in, #9@ 15.43 in, #10@ 19.59 in

Heel: #4@ 3.08 in, #5@ 4.78 in, #6@ 6.79 in, #7@ 9.25 in, #8@ 12.19 in, #9@ 15.43 in, #10@ 19.59 in

Key: No key defined

Min footing T&S reinf Area	1.94	in ²
Min footing T&S reinf Area per foot	0.78	in ² /ft

If one layer of horizontal bars:

#4@ 3.09 in
#5@ 4.78 in
#6@ 6.79 in

If two layers of horizontal bars:

#4@ 6.17 in
#5@ 9.57 in
#6@ 13.58 in

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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Summary of Overturning & Resisting Forces & Moments

Item	OVERTURNING.....				RESISTING.....		
	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	235.7	1.22	288.3	Soil Over HL (ab. water tbl)	67.6	2.04	137.9
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.04	137.9
Hydrostatic Force				Water Table			
Buoyant Force	=			Sloped Soil Over Heel	=		
Surcharge over Heel	=			Surcharge Over Heel	=		
Surcharge Over Toe	=			Adjacent Footing Load	=		
Adjacent Footing Load	=			Axial Dead Load on Stem	=		
Added Lateral Load	=			* Axial Live Load on Stem	=		
Load @ Stem Above Soil	= 104.0	8.01	832.8	Soil Over Toe	= 67.2	0.46	30.8
	=			Surcharge Over Toe	=		
				Stem Weight(s)	= 541.7	1.25	677.2
				Earth @ Stem Transitions	=		
Total	= 339.7	O.T.M.	= 1,121.2	Footing Weight	= 1,125.0	1.25	1,406.3
				Key Weight	=		
Resisting/Overturning Ratio		=	2.01	Vert. Component	=		
Vertical Loads used for Soil Pressure	=	1,905.5	lbs				
				Total =	1,801.5	lbs	R.M.= 2,252.1

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci

Horizontal Defl @ Top of Wall (approximate only) 0.199 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: LS JOC 2.ec6
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LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Calculated Rebar Stress, fs = 15604.29 psi

Lap Splice length for #5 bar specified in this stem design segment (25.4.2.3a) = 25.00 in

Development length for #5 bar specified in this stem design segment = 19.51 in

Hooked embedment length into footing for #5 bar specified in this stem design segment = 6.39 in

As Provided = 0.1163 in²/ft

As Required = 0.0921 in²/ft

Project Title:
Engineer:
Project ID:
Project Descr:

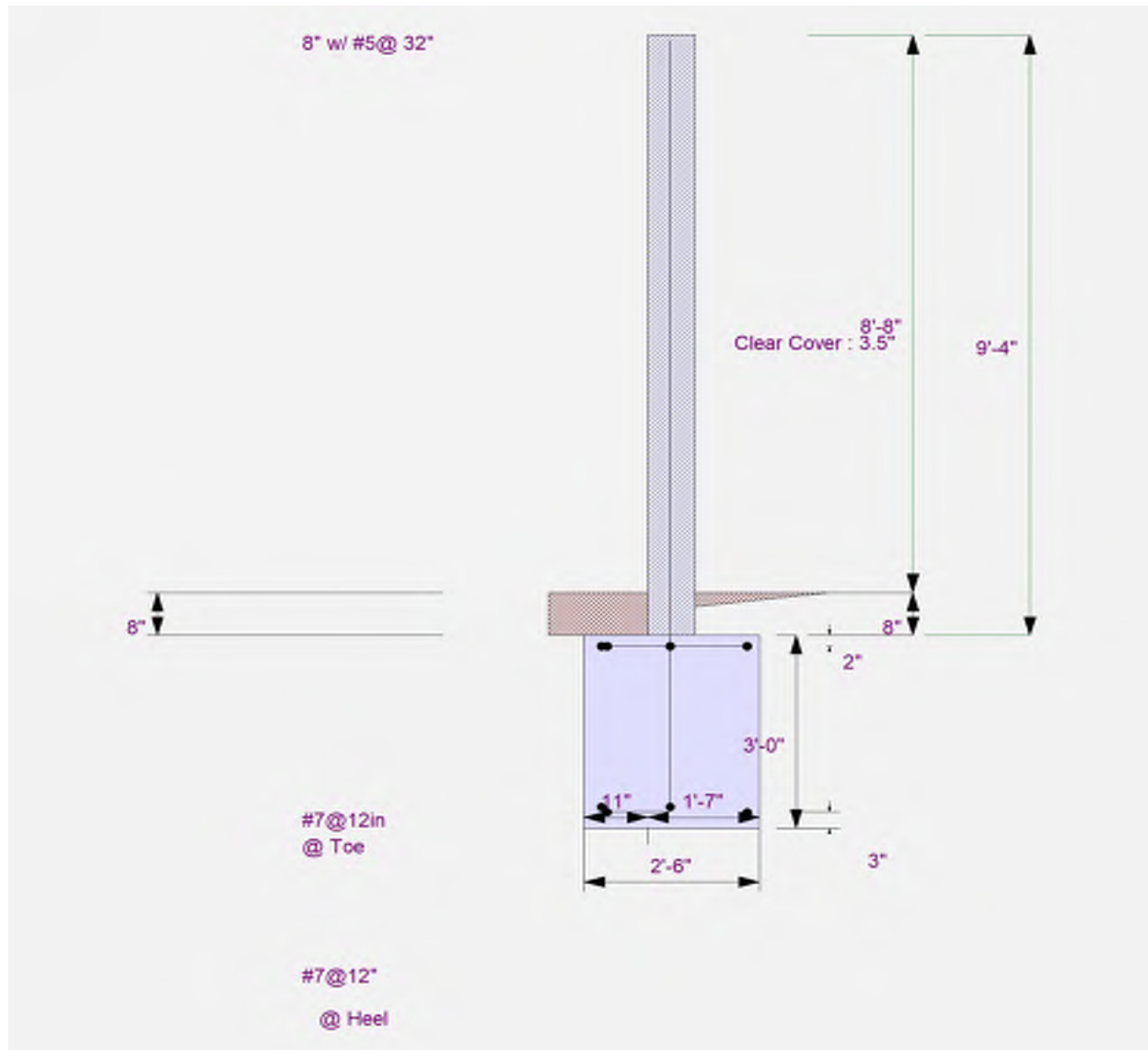
Cantilevered Retaining Wall

LIC# : KW-06017929, Build:20.24.09.03

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Project File: LS JOC 2.ec6

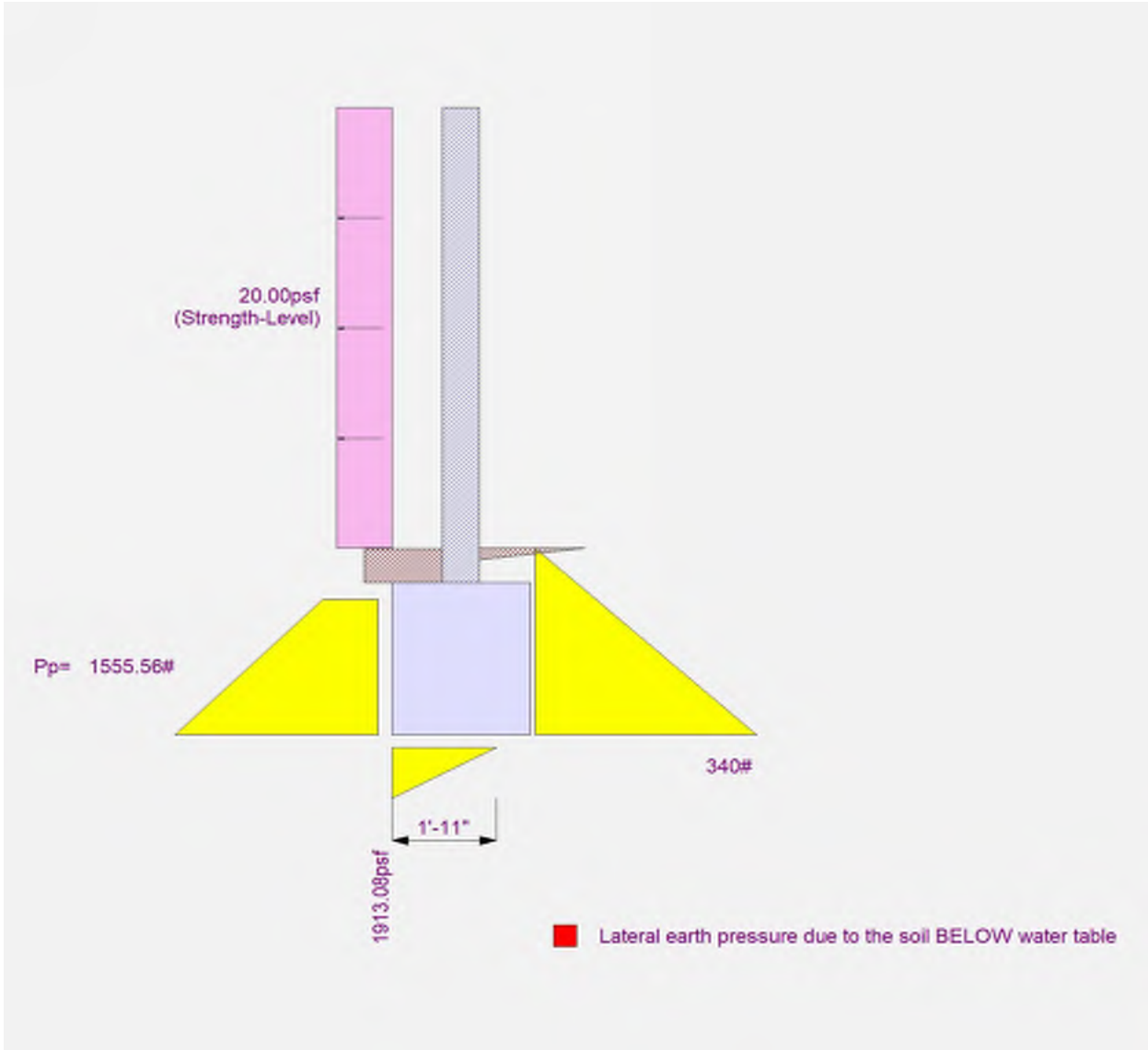
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Cantilevered Retaining Wall

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.



Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

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Code Reference:

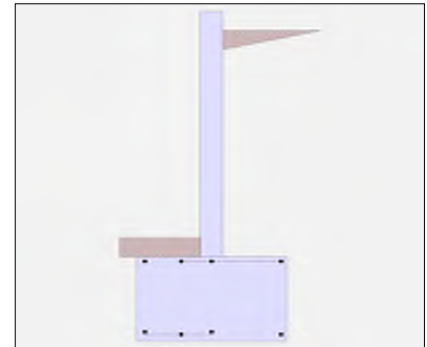
Calculations per IBC 2018 1807.3, CBC 2019, SDPWS 2015

Criteria

Retained Height	=	8.00 ft
Wall height above soil	=	0.67 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	8.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	12,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

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Design Summary

Wall Stability Ratios

Overtuning	=	1.62	OK
Sliding	=	1.63	OK
Global Stability	=	2.79	

Total Bearing Load = 5,654 lbs
...resultant ecc. = 14.66 in

Eccentricity outside middle third

Soil Pressure @ Toe	=	3,061 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	12,000 psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	4,285 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	1.3 psi	OK
Footing Shear @ Heel	=	7.2 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	2,117.5 lbs	
less 100% Passive Force	=	1,555.6 lbs	
less 100% Friction Force	=	1,887.7 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS
NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

ft =	Stem OK	0.00
Wall Material Above "Ht"	=	Concrete
Design Method	=	SD
Thickness	=	8.00
Rebar Size	=	# 5
Rebar Spacing	=	12.00
Rebar Placed at	=	Center

Design Data

fb/FB + fa/Fa	=	0.927

Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	1,792.0

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	4,778.7

Moment.....Allowable	=	5,154.8

Shear.....Actual

Service Level	psi =	
Strength Level	psi =	37.3

Shear.....Allowable	psi =	82.2

Anet (Masonry)	in2 =	

Wall Weight	psf =	100.0

Rebar Depth 'd'	in =	4.00

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	3,000.0
Fy	psi =	60,000.0

Bottom

SD SD

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.2885 in2/ft	
(4/3) * As :	0.3846 in2/ft	Min Stem T&S Reinf Area 1.665 in2
200bd/fy : 200(12)(4)/60000 :	0.16 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :
	=====	<u>One layer of :</u> <u>Two layers of :</u>
Required Area :	0.2885 in2/ft	#4@ 12.50 in #4@ 25.00 in
Provided Area :	0.31 in2/ft	#5@ 19.38 in #5@ 38.75 in
Maximum Area :	0.6503 in2/ft	#6@ 27.50 in #6@ 55.00 in

Footing Data

Toe Width	=	1.92 ft
Heel Width	=	2.58
Total Footing Width	=	4.50
Footing Thickness	=	36.00 in

f'c = 3,000 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm = 3.00 in

Footing Design Results

	Toe	Heel	
Factored Pressure	= 4,285	0	psf
Mu' : Upward	= 6,240	29	ft-#
Mu' : Downward	= 1,154	2,932	ft-#
Mu: Design	= 5,086	2,903	ft-#
φ Mn	= 86,331	89,031	ft-#
Actual 1-Way Shear	= 1.33	7.18	psi
Allow 1-Way Shear	= 82.16	82.16	psi
Toe Reinforcing	= # 7 @ 12.00 in		
Heel Reinforcing	= # 7 @ 12.00 in		
Key Reinforcing	= None Spec'd		
Footing Torsion, Tu	=	0.00	ft-lbs
Footing Allow. Torsion, φ Tn	=	0.00	ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 3.08 in, #5@ 4.78 in, #6@ 6.79 in, #7@ 9.25 in, #8@ 12.19 in, #9@ 15.43 in, #10@ 19.59 in

Heel: #4@ 3.08 in, #5@ 4.78 in, #6@ 6.79 in, #7@ 9.25 in, #8@ 12.19 in, #9@ 15.43 in, #10@ 19.59 in

Key: No key defined

Min footing T&S reinf Area 3.50 in2
Min footing T&S reinf Area per foot 0.78 in2 /ft

If one layer of horizontal bars:

#4@ 3.09 in
#5@ 4.78 in
#6@ 6.79 in

If two layers of horizontal bars:

#4@ 6.17 in
#5@ 9.57 in
#6@ 13.58 in

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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Summary of Overturning & Resisting Forces & Moments

Item	OVERTURNING.....				RESISTING.....		
	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	2,117.5	3.67	7,764.2	Soil Over HL (ab. water tbl)	1,686.7	3.54	5,973.6
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.54	5,973.6
Hydrostatic Force				Water Table			
Buoyant Force	=			Sloped Soil Over Heel	=		
Surcharge over Heel	=			Surcharge Over Heel	=		
Surcharge Over Toe	=			Adjacent Footing Load	=		
Adjacent Footing Load	=			Axial Dead Load on Stem	=		
Added Lateral Load	=			* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=			Soil Over Toe	=	140.6	134.7
	=			Surcharge Over Toe	=		
				Stem Weight(s)	=	867.0	1,950.8
				Earth @ Stem Transitions	=		
Total	=	2,117.5	O.T.M. = 7,764.2	Footing Weight	=	2,025.0	4,556.3
				Key Weight	=		
Resisting/Overturning Ratio		=	1.62	Vert. Component	=		
Vertical Loads used for Soil Pressure	=	5,653.9	lbs	Total	=	4,719.2 lbs	R.M.= 12,615.3

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.164 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: LS JOC 2.ec6
(c) ENERCALC, LLC 1982-2024

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

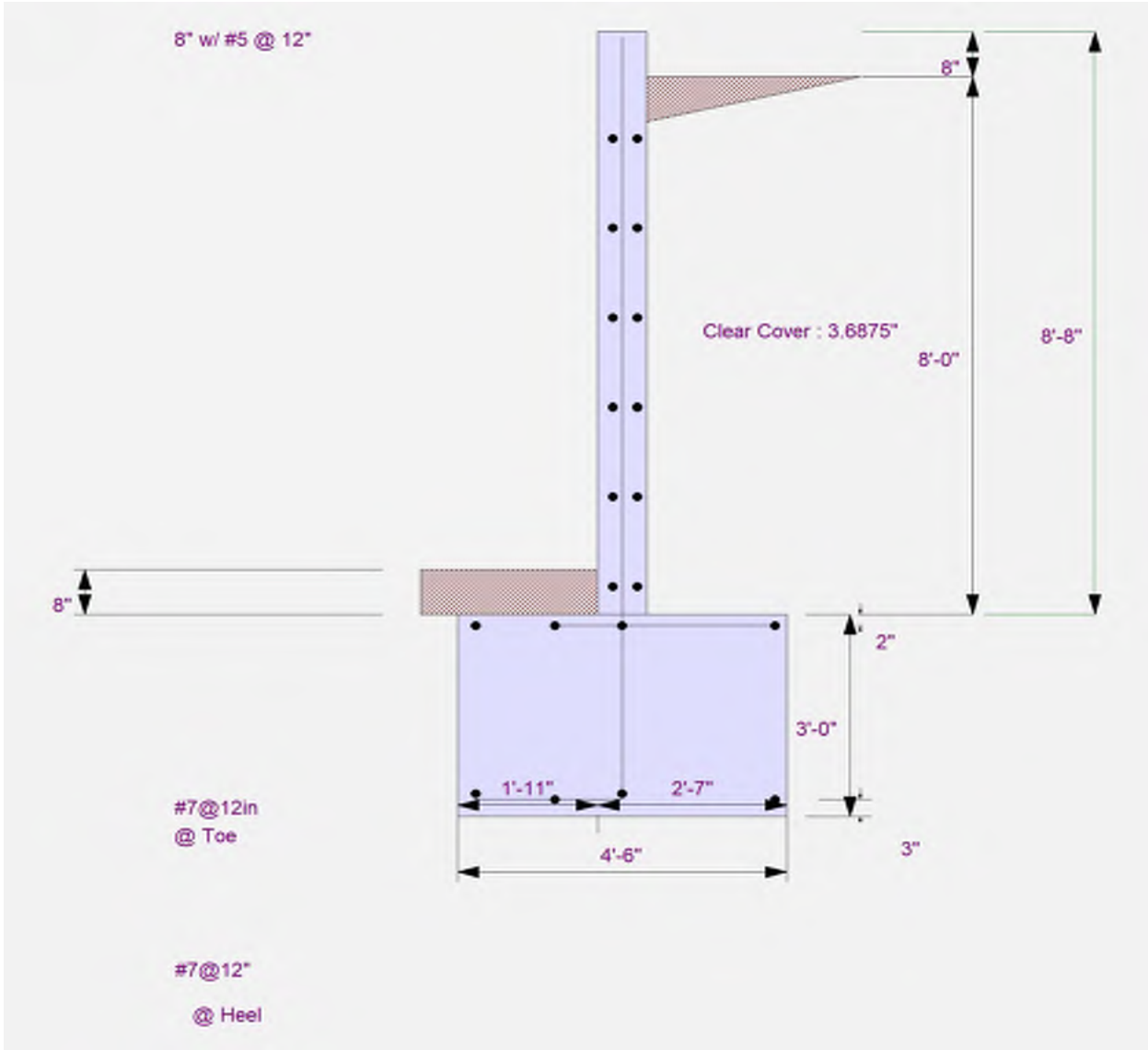
Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment (25.4.2.3a) =	21.36 in
Development length for #5 bar specified in this stem design segment =	16.43 in
Hooked embedment length into footing for #5 bar specified in this stem design segment =	9.59 in
As Provided =	0.3100 in2/ft
As Required =	0.2885 in2/ft

Cantilevered Retaining Wall

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.



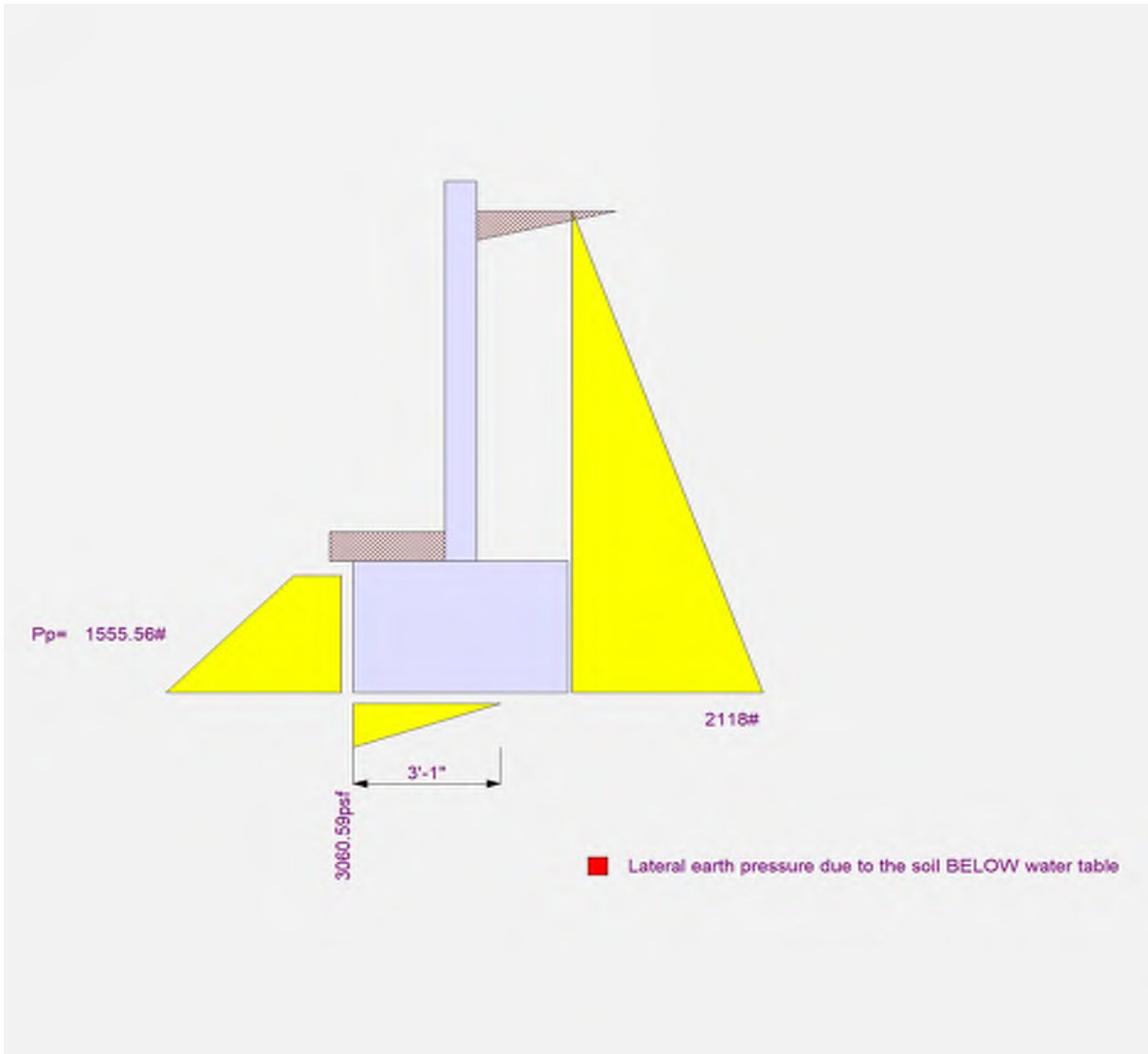
Cantilevered Retaining Wall

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

Project File: LS JOC 2.ec6

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Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

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Code Reference:

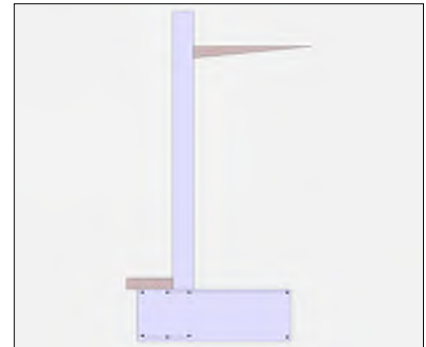
Calculations per IBC 2018 1807.3, CBC 2019, SDPWS 2015

Criteria

Retained Height	=	14.00 ft
Wall height above soil	=	2.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	8.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	4,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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Design Summary

Wall Stability Ratios

Overtuning	=	2.53	OK
Sliding	=	1.53	OK
Global Stability	=	2.20	

Total Bearing Load	=	15,451 lbs
...resultant ecc.	=	11.03 in

Eccentricity within middle third

Soil Pressure @ Toe	=	3,575 psf	OK
Soil Pressure @ Heel	=	546 psf	OK
Allowable	=	4,000 psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	4,281 psf	
ACI Factored @ Heel	=	654 psf	
Footing Shear @ Toe	=	1.6 psi	OK
Footing Shear @ Heel	=	15.8 psi	OK
Allowable	=	94.9 psi	

Sliding Calcs

Lateral Sliding Force	=	5,057.5 lbs	
less 100% Passive Force	-	1,555.6 lbs	
less 100% Friction Force	= -	6,180.3 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

ft =	Stem OK	0.00
Wall Material Above "Ht"	=	Concrete
Design Method	=	SD
Thickness	=	12.00
Rebar Size	=	# 6
Rebar Spacing	=	6.00
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa	=	0.720

Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	5,488.0

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	25,610.7

Moment.....Allowable	=	35,545.0

Shear.....Actual

Service Level	psi =	
Strength Level	psi =	47.5

Shear.....Allowable	psi =	94.9

Anet (Masonry)	in2 =	

Wall Weight	psf =	150.0

Rebar Depth 'd'	in =	9.63

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	4,000.0
Fy	psi =	60,000.0

Bottom

SD SD

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.6116 in ² /ft	
(4/3) * As :	0.8154 in ² /ft	Min Stem T&S Reinf Area 4.608 in ²
200bd/fy : 200(12)(9.625)/60000 :	0.385 in ² /ft	Min Stem T&S Reinf Area per ft of stem Height : 0.288 in ² /ft
0.0018bh : 0.0018(12)(12) :	0.2592 in ² /ft	Horizontal Reinforcing Options :
	=====	<u>One layer of :</u> <u>Two layers of :</u>
Required Area :	0.6116 in ² /ft	#4@ 8.33 in #4@ 16.67 in
Provided Area :	0.88 in ² /ft	#5@ 12.92 in #5@ 25.83 in
Maximum Area :	2.0862 in ² /ft	#6@ 18.33 in #6@ 36.67 in

Footing Data

Toe Width	=	1.75 ft
Heel Width	=	5.75
Total Footing Width	=	7.50
Footing Thickness	=	36.00 in

f'c = 4,000 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

	Toe	Heel	
Factored Pressure	= 4,281	654	psf
Mu' : Upward	= 6,124	16,012	ft-#
Mu' : Downward	= 962	43,906	ft-#
Mu: Design	= 5,162	27,894	ft-#
φ Mn	= 86,728	89,428	ft-#
Actual 1-Way Shear	= 1.62	15.81	psi
Allow 1-Way Shear	= 94.87	94.87	psi
Toe Reinforcing	= # 7 @ 12.00 in		
Heel Reinforcing	= # 7 @ 12.00 in		
Key Reinforcing	= None Spec'd		
Footing Torsion, Tu	=	0.00 ft-lbs	
Footing Allow. Torsion, φ Tn	=	0.00 ft-lbs	

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 3.08 in, #5@ 4.78 in, #6@ 6.79 in, #7@ 9.25 in, #8@ 12.19 in, #9@ 15.43 in, #10@ 19.59 in

Heel: #4@ 3.08 in, #5@ 4.78 in, #6@ 6.79 in, #7@ 9.25 in, #8@ 12.19 in, #9@ 15.43 in, #10@ 19.59 in

Key: No key defined

Min footing T&S reinf Area 5.83 in²
Min footing T&S reinf Area per foot 0.78 in² /ft

If one layer of horizontal bars:

#4@ 3.09 in
#5@ 4.78 in
#6@ 6.79 in

If two layers of horizontal bars:

#4@ 6.17 in
#5@ 9.57 in
#6@ 13.58 in

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

Summary of Overturning & Resisting Forces & Moments

Item	OVERTURNING.....				RESISTING.....		
	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	5,057.5	5.67	28,659.2	Soil Over HL (ab. water tbl)	7,315.0	5.13	37,489.4
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		5.13	37,489.4
Hydrostatic Force				Water Table			
Buoyant Force	=			Sloped Soil Over Heel	=		
Surcharge over Heel	=			Surcharge Over Heel	=		
Surcharge Over Toe	=			Adjacent Footing Load	=		
Adjacent Footing Load	=			Axial Dead Load on Stem	=		
Added Lateral Load	=			* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=			Soil Over Toe	=	128.3	112.3
	=			Surcharge Over Toe	=		
				Stem Weight(s)	=	2,400.0	5,400.0
				Earth @ Stem Transitions	=		
				Footing Weight	=	3,375.0	12,656.3
				Key Weight	=		
				Vert. Component	=	2,232.5	16,743.6
Total	=	5,057.5	O.T.M. = 28,659.2	Total	=	15,450.8 lbs	R.M. = 72,401.5
Resisting/Overturning Ratio		=	2.53	* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.			
Vertical Loads used for Soil Pressure	=	15,450.8	lbs				

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.212 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: LS JOC 2.ec6
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LIC# : KW-06017929, Build:20.24.09.03 J&S STRUCTURAL ENGINEERS, P.A.

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #6 bar specified in this stem design segment (25.4.2.3a) =	22.20 in
Development length for #6 bar specified in this stem design segment =	17.08 in
Hooked embedment length into footing for #6 bar specified in this stem design segment =	6.92 in
As Provided =	0.8800 in2/ft
As Required =	0.6116 in2/ft

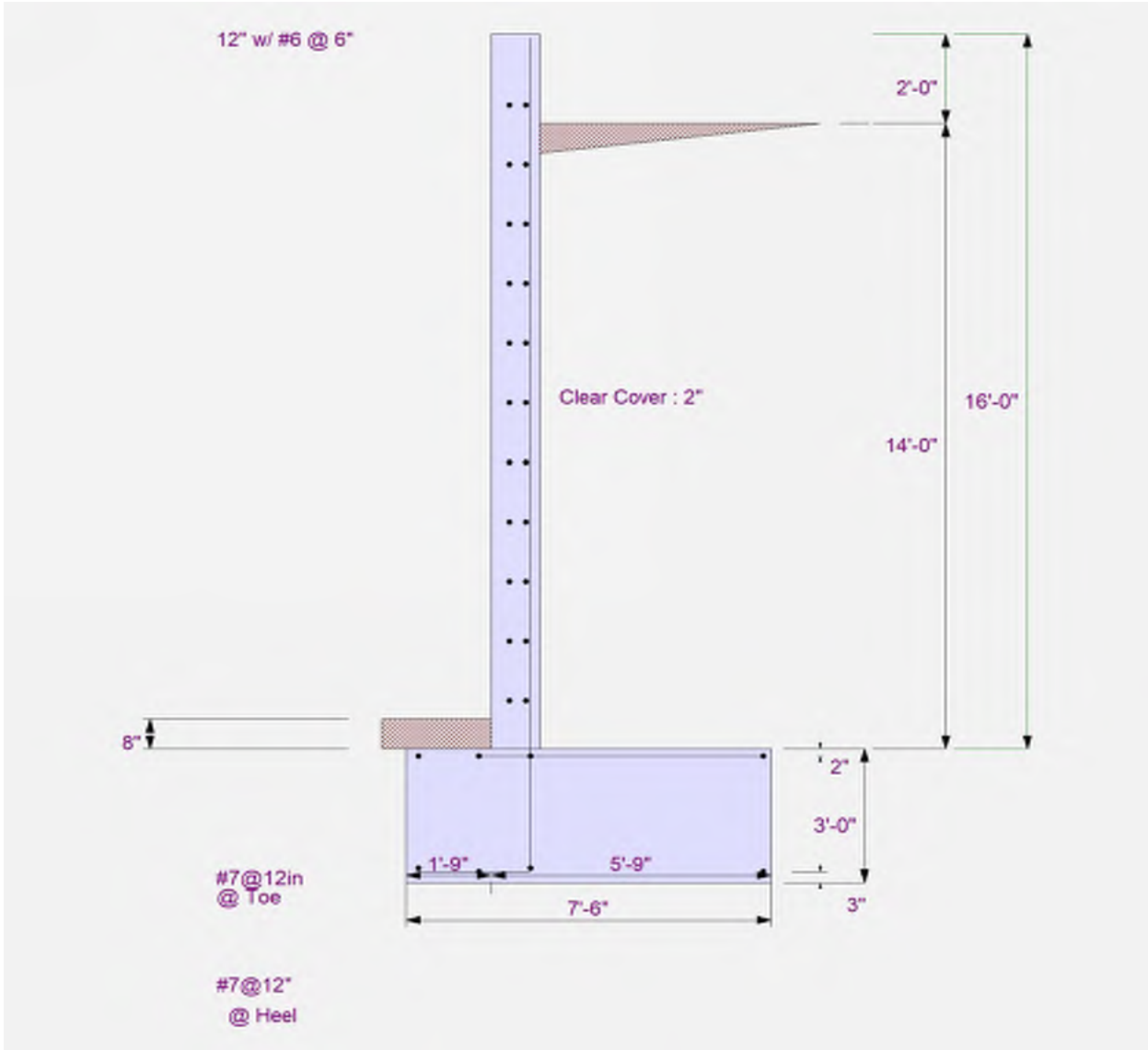
Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: LS JOC 2.ec6
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LIC# : KW-06017929, Build:20.24.09.03

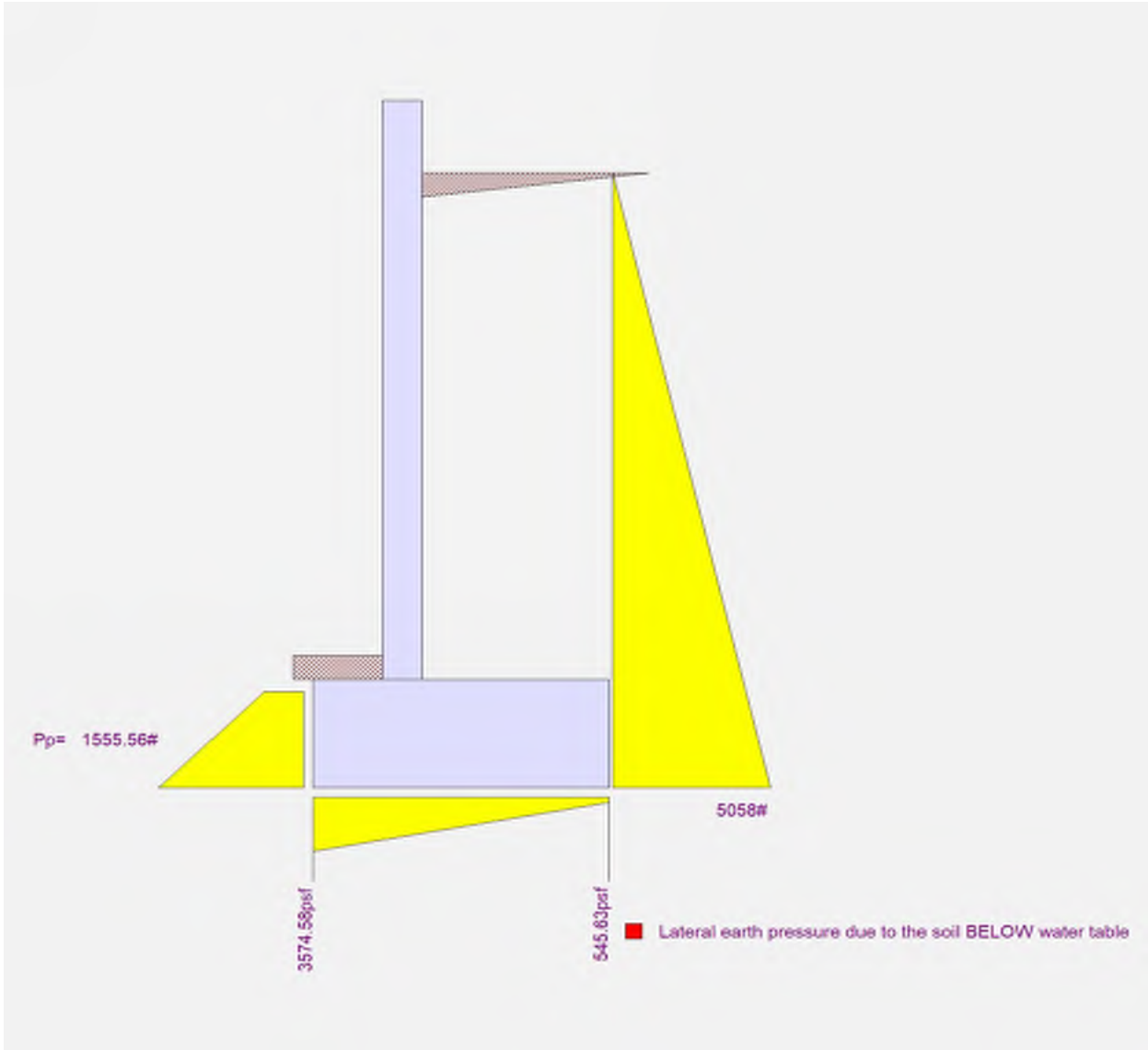
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Cantilevered Retaining Wall

LIC# : KW-06017929, Build:20.24.09.03

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Project Title:
Engineer:
Project ID:
Project Descr:

Restrained Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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DESCRIPTION: Mech yard Wall with beams

Code Reference:

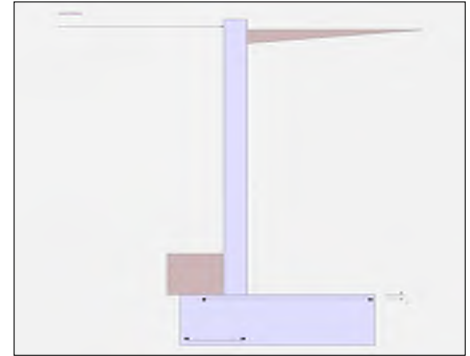
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	13.0 ft
Wall height above soil	=	0.50 ft
Total Wall Height	=	13.50 ft
Top Support Height	=	13.0 ft
Slope Behind Wall	=	0
Height of Soil over Toe	=	24.0 in

Soil Data

Allow Soil Bearing	=	12,000.0 psf
Equivalent Fluid Pressure Method		
At-Rest Heel Pressure	=	45.0 psf/ft
	=	0.0 psf/ft
Passive Pressure	=	250.0 psf/ft
Soil Density	=	110 pcf
Footing Soil Frictior	=	0.4 psf
Soil height to ignore for passive pressure	=	12 in



Surcharge Loads

Surcharge Over Heel	=	psf
>>>Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	lbs
Axial Live Load	=	lbs
Axial Load Eccentricity	=	in

Earth Pressure Seismic Load

Uniform Lateral Load Applied to Stem

Lateral Load	=	#/ft
...Height to Top	=	ft
...Height to Bottom	=	ft
Load Type	=	Wind (W) (Strength Level)
Wind on Exposed Stem	=	0.00 psf (Strength Level)
Wind acts left-to-right toward retention side.		

K_h Soil Density Multiplier = 0.2 g Added seismic per unit area = 0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	lbs
Footing Width	=	ft
Eccentricity	=	in
Wall to Ftg CL Dist	=	ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	ft
Poisson's Ratio	=	0.3

Design Summary

Total Bearing Load	=	11,915.8 lbs
...resultant ecc.	=	0.0 in
Soil Pressure @ Toe	=	1,588.78 psf OK
Soil Pressure @ Heel	=	1,588.78 psf OK
Allowable	=	psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,906.53 psf
ACI Factored @ Heel	=	1,906.53 psf
Footing Shear @ Toe	=	1.038 psi OK
Footing Shear @ Heel	=	-3.848 psi OK
Allowable	=	94.868 psi
Reaction at Top	=	759.43 lbs
Reaction at Bottom	=	4,645.14 lbs

Sliding Calcs

Lateral Sliding Force	=	4,645.14 lbs

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Concrete Stem Construction

Thickness	=	10.00 in	F_y	=	60000 psi
Wall Weight	=	125.0 psf	f'_c	=	3000 psi
Stem is FIXED to top of footing					

	@ Top Support	Mmax Between Top & Base	@ Base of Wall
	Stem OK	Stem OK	As < Min %
Design Height Above Ftg	= 13.0 ft	7.257 ft	0.00 ft
Rebar Size	= # 5	# 5	# 5
Rebar Spacing	= 16.00 in	16.00 in	16.00 in
Rebar Placed at	= Edge	Edge	Edge
Rebar Depth 'd'	= 7.688 in	8.188 in	7.688 in
Design Data			
fb/FB + fa/Fa	=	0.566	1.000
Mu....Actual	= 0.0 ft-#	4,716.09 ft-#	10,545.8 ft-#
Mn * Phi.....Allowable	= 7,803.85 ft-#	8,326.97 ft-#	7,803.85 ft-#
Shear Force @ this height	= 1,216.78 lbs		4,867.22 lbs
Shear.....Actual	= 13.190 psi		52.761 psi
Shear.....Allowable	= 82.158 psi		82.158 psi

Project Title:
Engineer:
Project ID:
Project Descr:

Restrained Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

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DESCRIPTION: Mech yard Wall with beams

Footing Strengths & Dimensions

Toe Width	=	1.750 ft
Heel Width	=	5.750
Total Footing Width	=	7.50
Footing Thickness	=	30.0 in

f'c = 4,000.0 psi Fy = 60000 psi
Footing Concrete Density = 150 pcf
Min. As % = 0.0018
Cover @ Top = 2 in @ Btm. = 3 in

Footing Design Results

	Toe	Heel	
Factored Pressure	= 1,906.53	1,906.53	psf
Mu' : Upward	= 2,919.38		ft-#
Mu' : Downward	= 1,093.31		ft-#
Mu: Design	= 1,826	3,136	ft-#
Actual 1-Way Shear	= 1.038	-3.848	psi
Allow 1-Way Shear	= 94.868	94.868	psi

Other Acceptable Sizes & Spacings:

Toe: # 7 @ 18.00 in -or- #4@ 3.70 in, #5@ 5.74 in, #6@ 8.14 in, #7@ 11.11
Heel: # 6 @ 18.00 in -or- #4@ 3.70 in, #5@ 5.74 in, #6@ 8.14 in, #7@ 11.11

Min footing T&S reinf Area 4.86 in2
Min footing T&S reinf Area per foot 0.65 in2 /ft
If one layer of horizontal bars: If two layers of horizontal bars:
#4@ 3.70 in #4@ 7.41 in
#5@ 5.74 in #5@ 11.48 in
#6@ 8.15 in #6@ 16.30 in

Summary of Forces on Footing : Slab is NOT providing sliding, stem is FIXED at footing

Forces acting on footing for sliding & soil pressure....

Sliding Forces

Stem Shear @ Top of Footing	=	3,042.01 lbs
Heel Active Pressure	=	1,603.13
Sliding Force	=	4,645.14 lbs

Stem is specified to be fixed to footing, and top restraint is assumed to react out any tendency for moment at the footing/soil interface, so uniform soil pressure is assumed.

Load & Moment Summary For Footing : For Soil Pressure Calcs

Moment @ Top of Footing Applied from Stem	=	-6,591.13ft-#
Surcharge Over Heel	0.0 0.0	0.0
Adjacent Footing Load	= 0.0 lbs 0.0 ft	0.0ft-#
Axial Dead Load on Stem	= 0.0 lbs 0.0 ft	0.0ft-#
Soil Over Toe	= 385.0 lbs 0.8750 ft	336.875ft-#
Surcharge Over Toe	= 0.0 lbs 0.0 ft	0.0ft-#
Stem Weight	= 1,687.50 lbs 2.167 ft	3,656.25ft-#
Soil Over Heel	= 7,030.83 lbs 5.042 ft	35,447.1ft-#
Footing Weight	= 2,812.50 lbs 3.750 ft	10,546.9ft-#
Total Vertical Force	= 11,915.8 lbs	Base Moment = 43,396.0ft-#

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Project Title:
Engineer:
Project ID:
Project Descr:

Restrained Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Mech yard Wall with beams

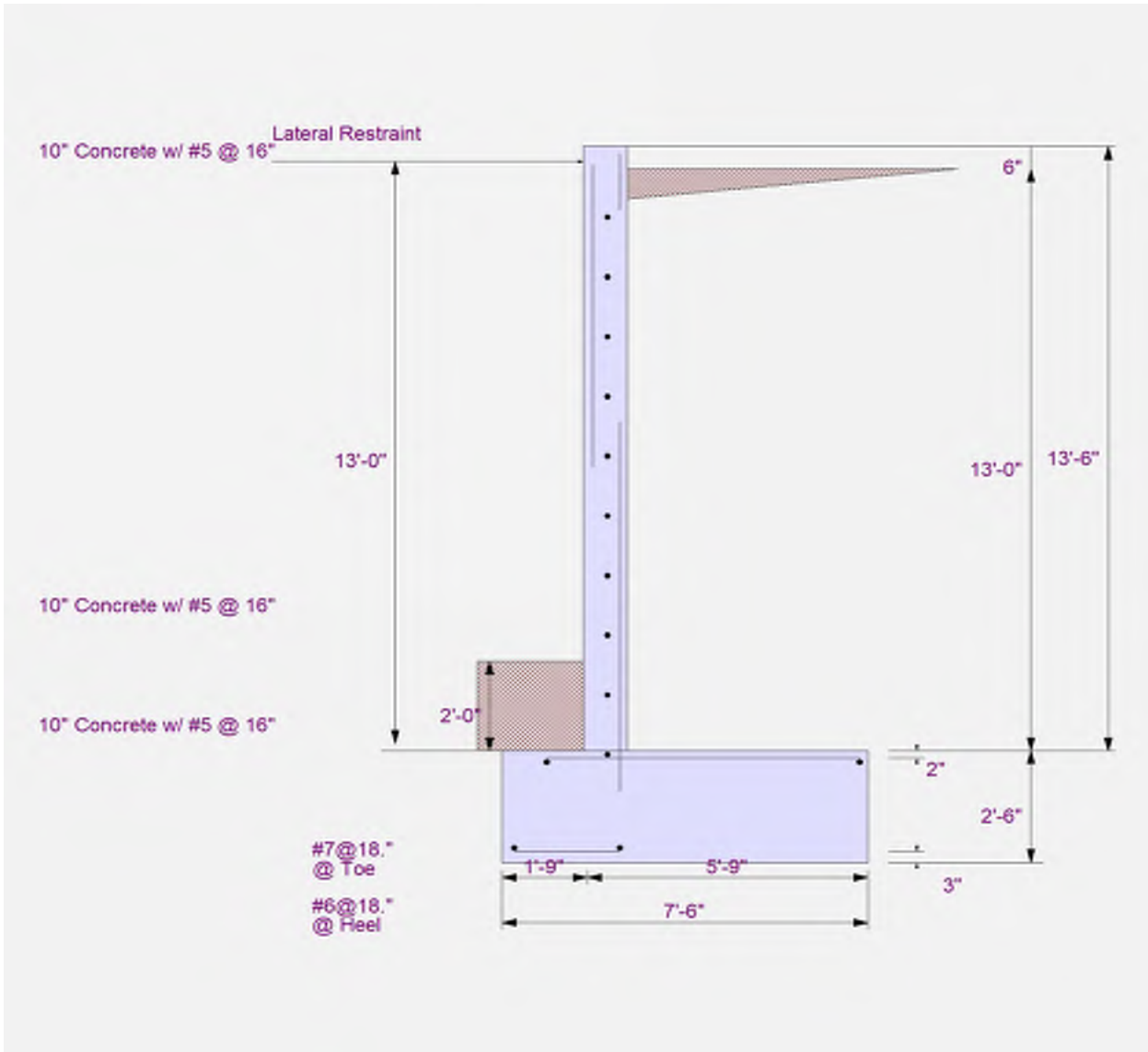
Rebar Lap & Embedment Lengths Information

Project Title:
Engineer:
Project ID:
Project Descr:

Restrained Retaining Wall

Project File: LS JOC 2.ec6
(c) ENERCALC, LLC 1982-2024

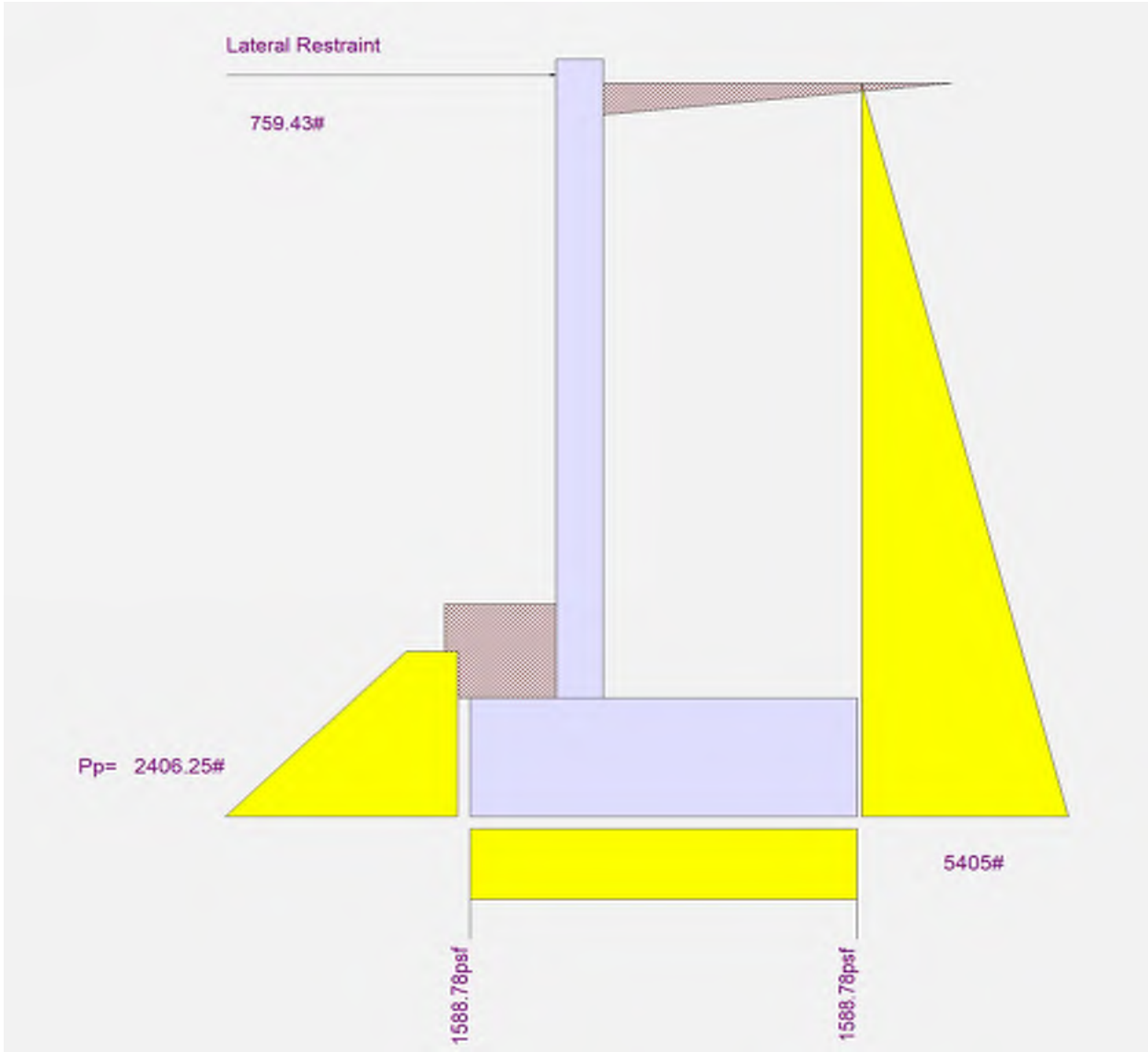
LIC# : KW-06017929, Build:20.24.09.03 J&S STRUCTURAL ENGINEERS, P.A.
DESCRIPTION: Mech yard Wall with beams



Restrained Retaining Wall

Project File: LS JOC 2.ec6
(c) ENERCALC, LLC 1982-2024

LIC# : KW-06017929, Build:20.24.09.03 J&S STRUCTURAL ENGINEERS, P.A.
DESCRIPTION: Mech yard Wall with beams



Project Title:
Engineer:
Project ID:
Project Descr:

Restrained Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Mech yard Wall with beams

Code Reference:

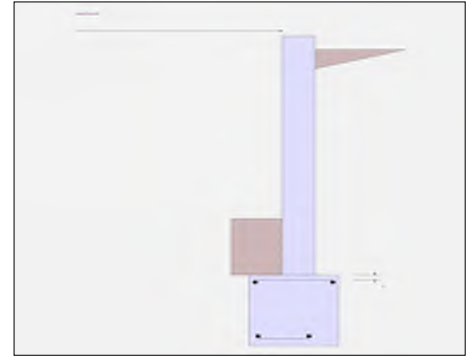
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	8.0 ft
Wall height above soil	=	0.50 ft
Total Wall Height	=	8.50 ft
Top Support Height	=	8.5 ft
Slope Behind Wall	=	0
Height of Soil over Toe	=	24.0 in

Soil Data

Allow Soil Bearing	=	12,000.0 psf
Equivalent Fluid Pressure Method		
At-Rest Heel Pressure	=	45.0 psf/ft
	=	0.0 psf/ft
Passive Pressure	=	250.0 psf/ft
Soil Density	=	110 pcf
Footing Soil Frictior	=	0.4 psf
Soil height to ignore for passive pressure	=	12 in



Surcharge Loads

Surcharge Over Heel	=	psf
>>>Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	lbs
Axial Live Load	=	lbs
Axial Load Eccentricity	=	in

Earth Pressure Seismic Load

Uniform Lateral Load Applied to Stem

Lateral Load	=	#/ft
...Height to Top	=	ft
...Height to Bottom	=	ft
Load Type	=	Wind (W) (Strength Level)
Wind on Exposed Stem	=	0.00 psf (Strength Level)
Wind acts left-to-right toward retention side.		
K_h Soil Density Multiplier	=	0.2 g

Adjacent Footing Load

Adjacent Footing Load	=	lbs
Footing Width	=	ft
Eccentricity	=	in
Wall to Ftg CL Dist	=	ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	ft
Poisson's Ratio	=	0.3
Added seismic per unit area	=	0.0 psf

Design Summary

Total Bearing Load	=	2,806.67 lbs
...resultant ecc.	=	0.0 in
Soil Pressure @ Toe	=	1,122.67 psf OK
Soil Pressure @ Heel	=	1,122.67 psf OK
Allowable	=	psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,347.20 psf
ACI Factored @ Heel	=	1,347.20 psf
Footing Shear @ Toe	=	2.718 psi OK
Footing Shear @ Heel	=	-0.3194 psi OK
Allowable	=	94.868 psi
Reaction at Top	=	257.862 lbs
Reaction at Bottom	=	2,221.76 lbs

Sliding Calcs

Lateral Sliding Force	=	2,221.76 lbs

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Concrete Stem Construction

Thickness	=	10.00 in
Fy	=	60000 psi
Wall Weight	=	125.0 psf
f'c	=	3000 psi
Stem is FIXED to top of footing		

	@ Top Support	Mmax Between Top & Base	@ Base of Wall
	Stem OK	Stem OK	Stem OK
Design Height Above Ftg	= 8.5 ft	4.643 ft	0.00 ft
Rebar Size	= # 5	# 5	# 5
Rebar Spacing	= 16.00 in	16.00 in	16.00 in
Rebar Placed at	= Edge	Edge	Edge
Rebar Depth 'd'	= 7.688 in	8.188 in	7.688 in
Design Data			
fb/FB + fa/Fa	=	0.137	0.336
Mu....Actual	=	0.0 ft-#	1,143.69 ft-#
Mn * Phi.....Allowable	=	7,803.85 ft-#	8,326.97 ft-#
Shear Force @ this height	=	414.179 lbs	1,889.82 lbs
Shear.....Actual	=	4.490 psi	20.486 psi
Shear.....Allowable	=	82.158 psi	82.158 psi

Project Title:
Engineer:
Project ID:
Project Descr:

Restrained Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Mech yard Wall with beams

Footing Strengths & Dimensions

Toe Width	=	1.0 ft
Heel Width	=	1.50
Total Footing Width	=	2.50
Footing Thickness	=	30.0 in

f'_c = 4,000.0 psi F_y = 60000 psi
Footing Concrete Density = 150 pcf
Min. As % = 0.0018
Cover @ Top = 2 in @ Btm. = 3 in

Footing Design Results

	Toe	Heel	
Factored Pressure	= 1,347.20	1,347.20	psf
Mu' : Upward	= 673.60		ft-#
Mu' : Downward	= 357.0		ft-#
Mu: Design	= 317	35	ft-#
Actual 1-Way Shear	= 2.718	-0.3194	psi
Allow 1-Way Shear	= 94.868	94.868	psi

Other Acceptable Sizes & Spacings:

Toe: # 7 @ 18.00 in -or- #4@ 3.70 in, #5@ 5.74 in, #6@ 8.14 in, #7@ 11.11 in
Heel: # 6 @ 18.00 in -or- #4@ 3.70 in, #5@ 5.74 in, #6@ 8.14 in, #7@ 11.11 in

Min footing T&S reinf Area 1.62 in²
Min footing T&S reinf Area per foot 0.65 in² /ft
If one layer of horizontal bars: If two layers of horizontal bars:
#4@ 3.70 in #4@ 7.41 in
#5@ 5.74 in #5@ 11.48 in
#6@ 8.15 in #6@ 16.30 in

Summary of Forces on Footing : Slab is NOT providing sliding, stem is FIXED at footing

Forces acting on footing for sliding & soil pressure....

Sliding Forces

Stem Shear @ Top of Footing	=	1,181.14 lbs
Heel Active Pressure	=	1,040.63
Sliding Force	=	2,221.76 lbs

Stem is specified to be fixed to footing, and top restraint is assumed to react out any tendency for moment at the footing/soil interface, so uniform soil pressure is assumed.

Load & Moment Summary For Footing : For Soil Pressure Calcs

Moment @ Top of Footing Applied from Stem	=	-1,639.67ft-#
Surcharge Over Heel	= 0.0	0.0
Adjacent Footing Load	= 0.0 lbs	0.0 ft
Axial Dead Load on Stem	= 0.0 lbs	0.0 ft
Soil Over Toe	= 220.0 lbs	0.50 ft
Surcharge Over Toe	= 0.0 lbs	0.0 ft
Stem Weight	= 1,062.50 lbs	1.417 ft
Soil Over Heel	= 586.67 lbs	2.167 ft
Footing Weight	= 937.50 lbs	1.250 ft
Total Vertical Force	= 2,806.67 lbs	Base Moment = 2,418.52ft-#

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Project Title:
Engineer:
Project ID:
Project Descr:

Restrained Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Mech yard Wall with beams

Rebar Lap & Embedment Lengths Information

Project Title:
Engineer:
Project ID:
Project Descr:

Restrained Retaining Wall

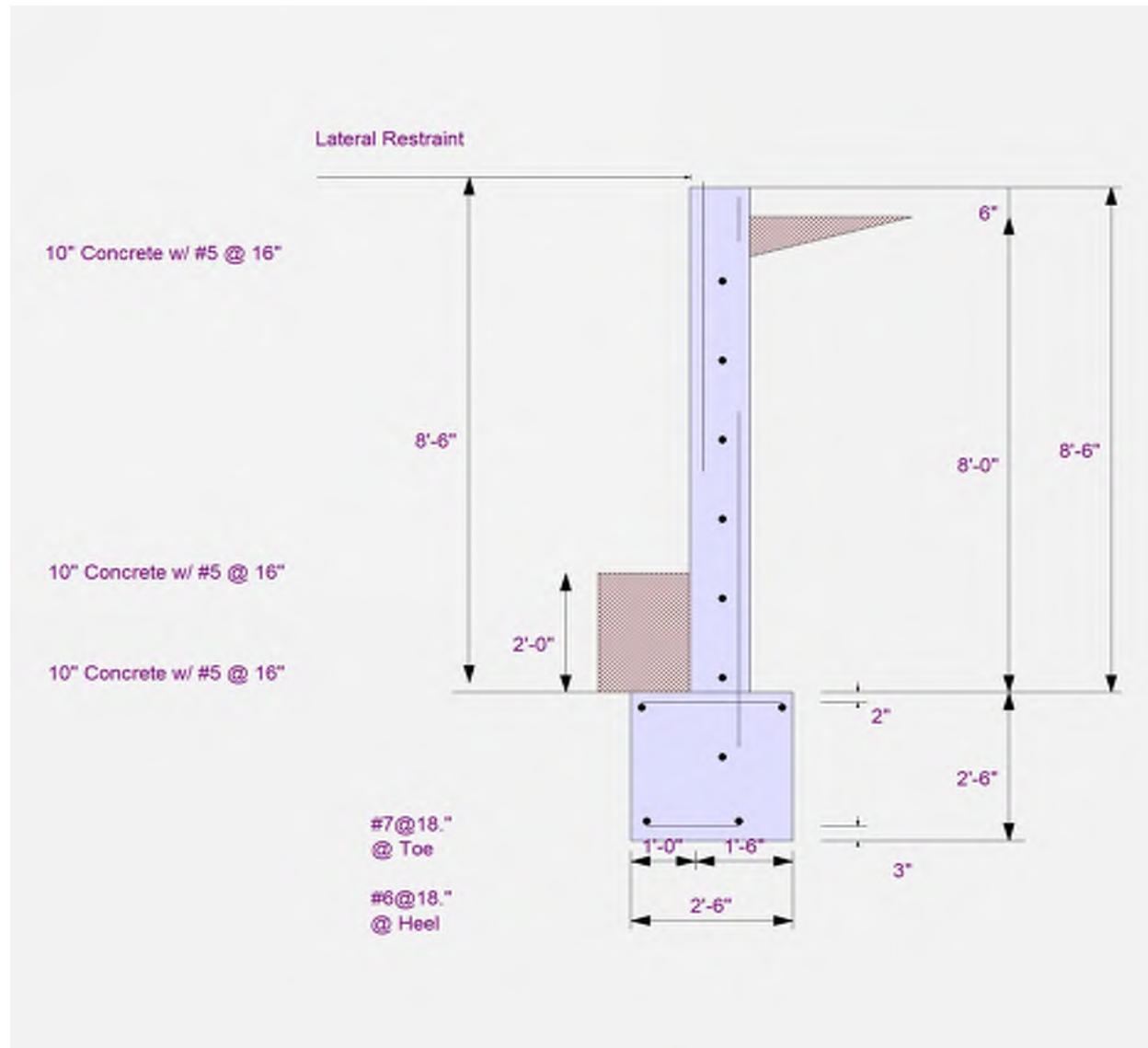
Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Mech yard Wall with beams



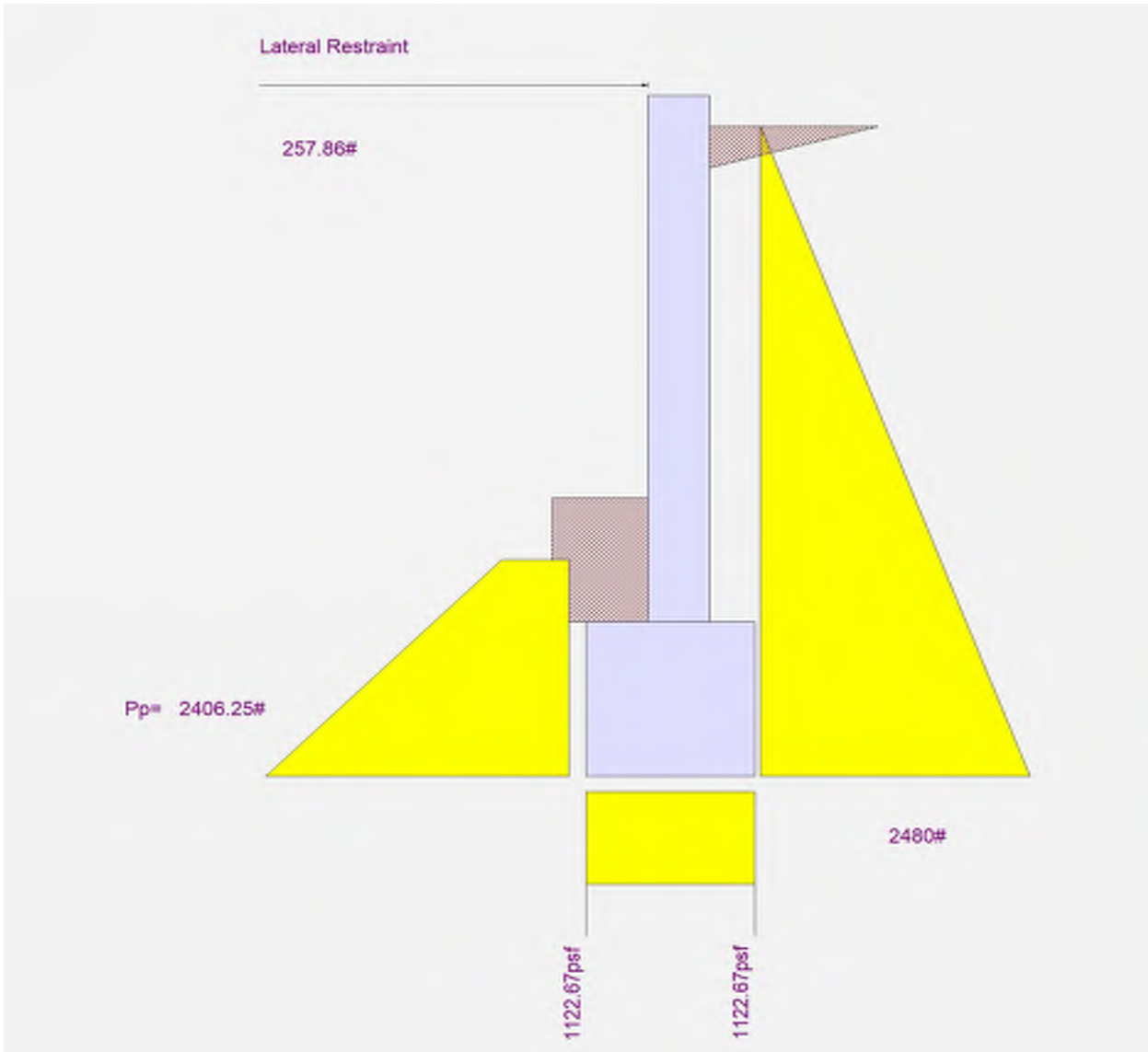
Restrained Retaining Wall

Project File: LS JOC 2.ec6
(c) ENERCALC, LLC 1982-2024

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

DESCRIPTION: Mech yard Wall with beams



Project Title:
Engineer:
Project ID:
Project Descr:

Restrained Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Mech yard Wall with beams

Code Reference:

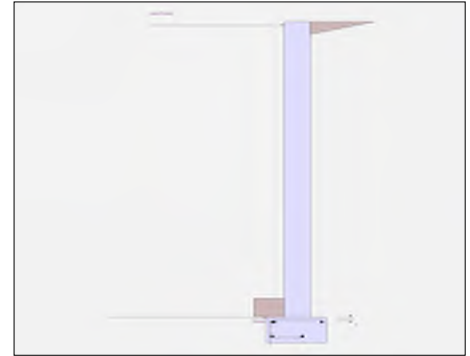
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	15.670 ft
Wall height above soil	=	0.0 ft
Total Wall Height	=	15.670 ft
Top Support Height	=	15.330 ft
Slope Behind Wall	=	0
Height of Soil over Toe	=	12.0 in

Soil Data

Allow Soil Bearing	=	12,000.0 psf
Equivalent Fluid Pressure Method		
At-Rest Heel Pressure	=	56.0 psf/ft
	=	0.0 psf/ft
Passive Pressure	=	250.0 psf/ft
Soil Density	=	110 pcf
Footing Soil Frictior	=	0.4 psf
Soil height to ignore for passive pressure	=	12 in



Surcharge Loads

Surcharge Over Heel	=	psf
>>>Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	lbs
Axial Live Load	=	lbs
Axial Load Eccentricity	=	in

Earth Pressure Seismic Load

Uniform Lateral Load Applied to Stem

Lateral Load	=	#/ft
...Height to Top	=	ft
...Height to Bottom	=	ft
Load Type	=	Wind (W) (Strength Level)
Wind on Exposed Stem	=	0.00 psf (Strength Level)
Wind acts left-to-right toward retention side.		

K_h Soil Density Multiplier = 0.2 g Added seismic per unit area = 0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	lbs
Footing Width	=	ft
Eccentricity	=	in
Wall to Ftg CL Dist	=	ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	ft
Poisson's Ratio	=	0.3

Design Summary

Total Bearing Load	=	4,091.30 lbs
...resultant ecc.	=	-3.440 in
Soil Pressure @ Toe	=	510.58 psf OK
Soil Pressure @ Heel	=	2,762.46 psf OK
Allowable	=	psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	612.69 psf
ACI Factored @ Heel	=	3,314.96 psf
Footing Shear @ Toe	=	0.5269 psi OK
Footing Shear @ Heel	=	2.635 psi OK
Allowable	=	94.868 psi
Reaction at Top	=	2,340.34 lbs
Reaction at Bottom	=	5,752.56 lbs

Sliding Calcs

Lateral Sliding Force	=	5,752.56 lbs

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Concrete Stem Construction

Thickness	=	12.00 in	F_y	=	60000 psi
Wall Weight	=	150.0 psf	f'_c	=	3000 psi
Stem is FREE to rotate at top of footing					

	@ Top Support	Mmax Between Top & Base	@ Base of Wall
	Stem OK	Stem OK	Stem OK
Design Height Above Ftg	= 15.330 ft	6.588 ft	0.00 ft
Rebar Size	= # 7	# 7	# 7
Rebar Spacing	= 12.00 in	12.00 in	12.00 in
Rebar Placed at	= Edge	Edge	Edge
Rebar Depth 'd'	= 9.563 in	10.063 in	9.563 in
Design Data			
fb/FB + fa/Fa	= 0.000	0.844	
Mu....Actual	= 0.5869 ft-#	21,581.9 ft-#	0.0 ft-#
Mn * Phi.....Allowable	= 24,225.8 ft-#	25,575.8 ft-#	24,225.8 ft-#
Shear Force @ this height	= 3,743.01 lbs		7,252.40 lbs
Shear.....Actual	= 32.619 psi		63.202 psi
Shear.....Allowable	= 82.158 psi		82.158 psi

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Restrained Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Mech yard Wall with beams

Footing Strengths & Dimensions

Toe Width = 1.83333333 ft
 Heel Width = .66666666 ft
 Total Footing Width = 2.50 ft
 Footing Thickness = 16.0 in

f'_c = 4,000.0 psi F_y = 60000 psi
 Footing Concrete Density = 150 pcf
 Min. As % = 0.0018
 Cover @ Top = 2 in @ Btm. = 3 in

Footing Design Results

	Toe	Heel	
Factored Pressure	= 612.69	3,314.96	psf
Mu' : Upward	= 316.994		ft-#
Mu' : Downward	= 129.167		ft-#
Mu: Design	= 188	-197	ft-#
Actual 1-Way Shear	= 0.5269	2.635	psi
Allow 1-Way Shear	= 94.868	94.868	psi

Other Acceptable Sizes & Spacings:

Toe: # 7 @ 18.00 in -or- #4@ 6.94 in, #5@ 10.76 in, #6@ 15.27 in, #7@ 20.1 in
 Heel: # 6 @ 18.00 in -or- #4@ 6.94 in, #5@ 10.76 in, #6@ 15.27 in, #7@ 20.1 in

Min footing T&S reinf Area 0.86 in²
 Min footing T&S reinf Area per foot 0.35 in² /ft
 If one layer of horizontal bars: If two layers of horizontal bars:
 #4@ 6.94 in #4@ 13.89 in
 #5@ 10.76 in #5@ 21.53 in
 #6@ 15.28 in #6@ 30.56 in

Summary of Forces on Footing : Slab RESISTS sliding, stem is PINNED at footing

Forces acting on footing soil pressure

(taking moments about front of footing to find eccentricity)

Surcharge Over Heel	=	0.0lbs	0.0 ft	0.0ft-#
Axial Dead Load on Stem	=	0.0lbs	0.0 ft	0.0ft-#
Soil Over Toe	=	91.667lbs	0.4167 ft	38.194ft-#
Adjacent Footing Load	=	0.0lbs	0.0 ft	0.0ft-#
Surcharge Over Toe	=	0.0lbs	0.0 ft	0.0ft-#
Stem Weight	=	2,350.50lbs	1.333 ft	3,134.0ft-#
Soil Over Heel	=	1,149.13lbs	2.167 ft	2,489.79ft-#
Footing Weight	=	500.0lbs	1.250 ft	625.0ft-#
Total Vertical Force	=	4,091.30lbs	Moment =	6,286.98ft-#

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Project Title:
Engineer:
Project ID:
Project Descr:

Restrained Retaining Wall

Project File: LS JOC 2.ec6
(c) ENERCALC, LLC 1982-2024

LIC# : KW-06017929, Build:20.24.09.03 J&S STRUCTURAL ENGINEERS, P.A.

DESCRIPTION: Mech yard Wall with beams

Rebar Lap & Embedment Lengths Information

Project Title:
Engineer:
Project ID:
Project Descr:

Restrained Retaining Wall

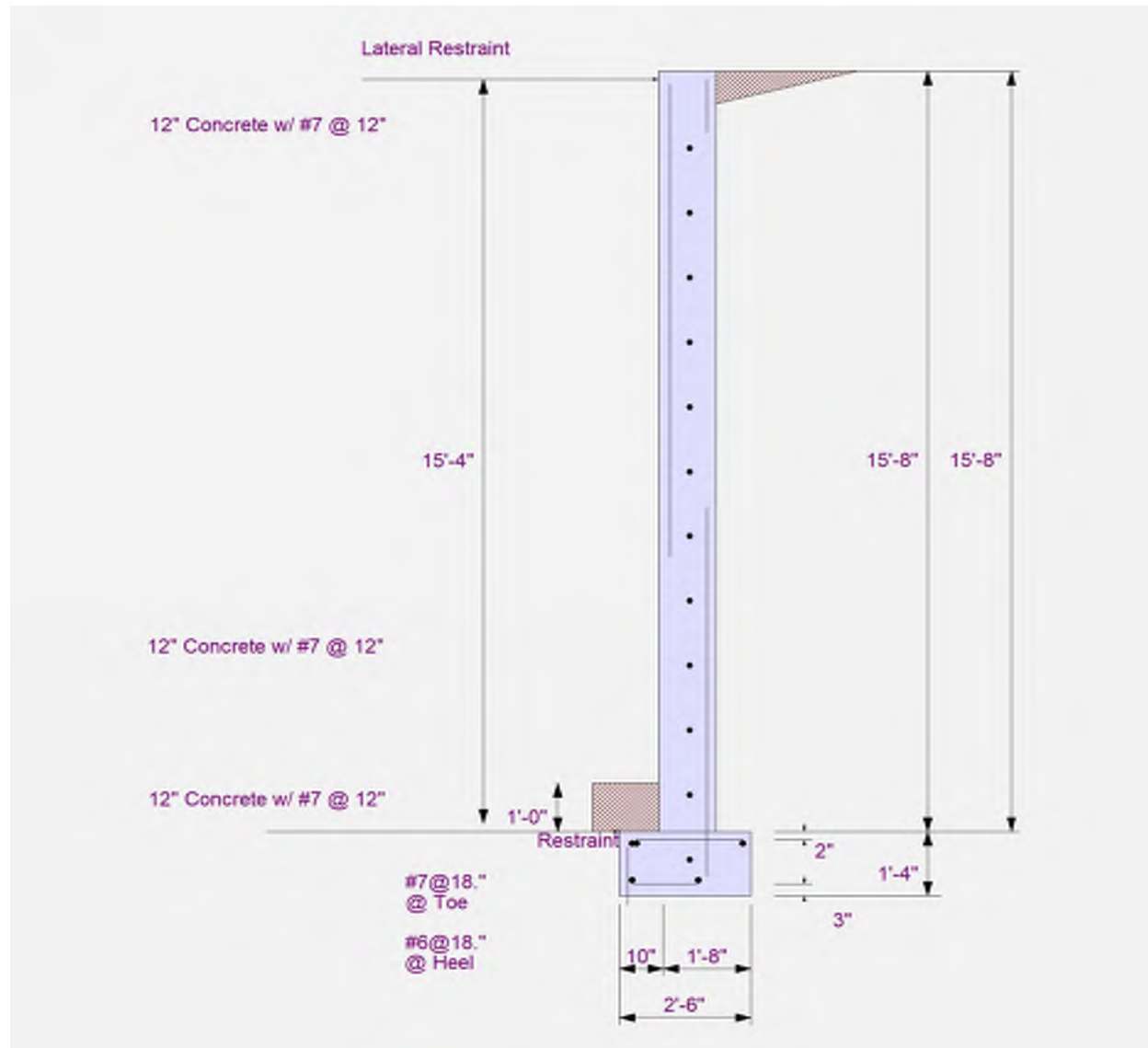
Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Mech yard Wall with beams

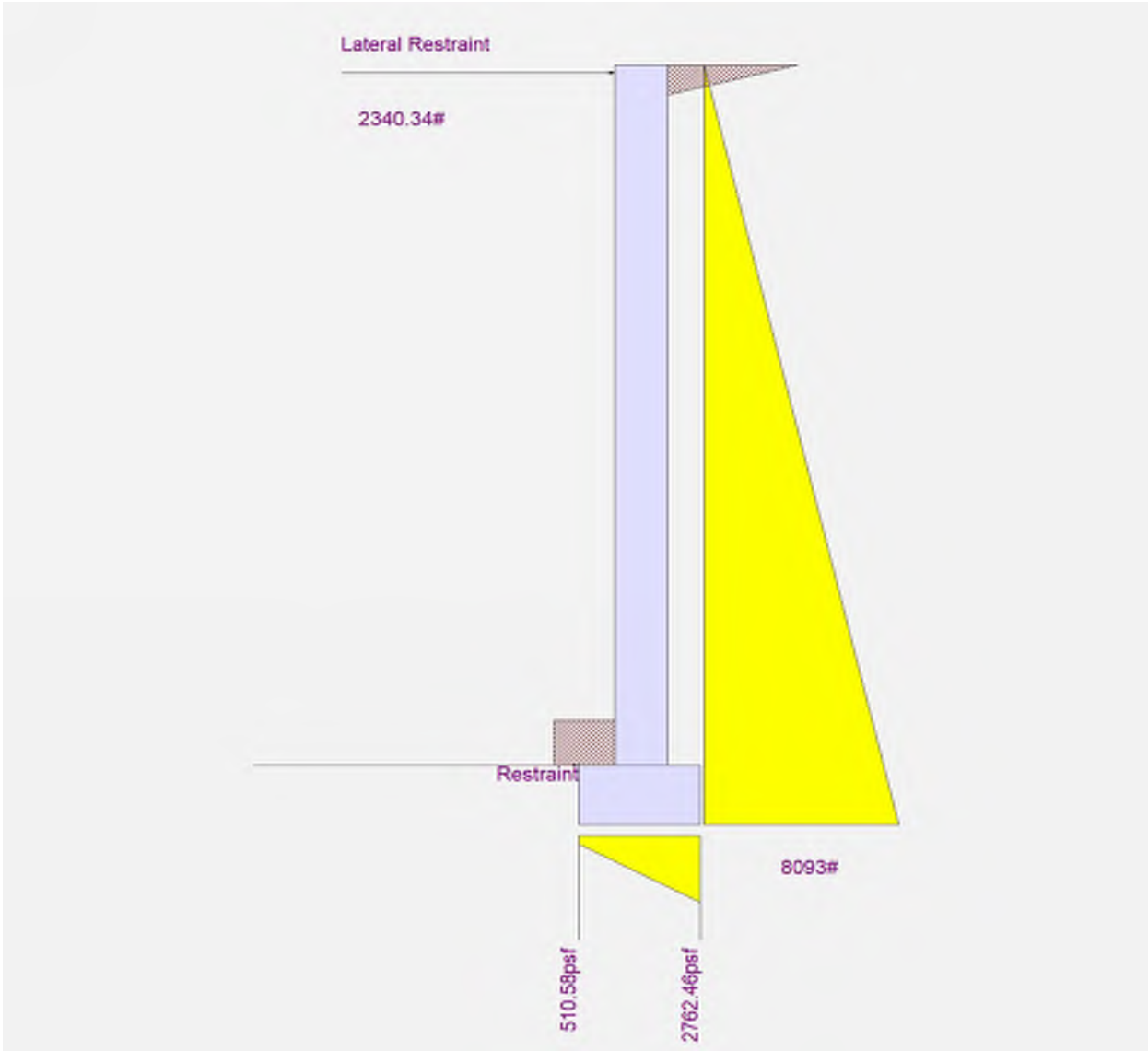


Project Title:
Engineer:
Project ID:
Project Descr:

Restrained Retaining Wall

Project File: LS JOC 2.ec6
(c) ENERCALC, LLC 1982-2024

LIC# : KW-06017929, Build:20.24.09.03 J&S STRUCTURAL ENGINEERS, P.A.
DESCRIPTION: Mech yard Wall with beams



Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

Code Reference:

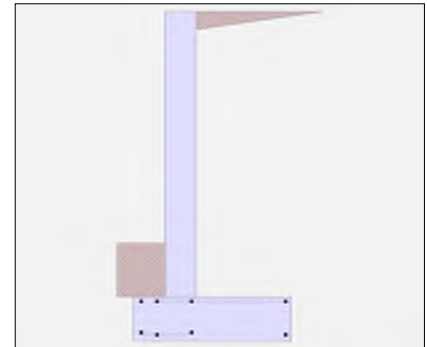
Calculations per IBC 2018 1807.3, CBC 2019, SDPWS 2015

Criteria

Retained Height	=	10.67 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	24.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	12,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

(c) ENERCALC, LLC 1982-2024

Design Summary

Wall Stability Ratios

Overturing	=	1.64	OK
Sliding	=	1.57	OK
Global Stability	=	2.33	

Total Bearing Load	=	7,767 lbs	
...resultant ecc.	=	17.24 in	

Eccentricity outside middle third

Soil Pressure @ Toe	=	4,134 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	12,000 psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	5,787 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	1.2 psi	OK
Footing Shear @ Heel	=	18.3 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	2,663.4 lbs	
less 100% Passive Force	=	1,555.6 lbs	
less 100% Friction Force	=	2,636.6 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS
NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftg

ft =	Stem OK	0.00
Wall Material Above "Ht"	=	Concrete
Design Method	=	SD
Thickness	=	12.00
Rebar Size	=	# 5
Rebar Spacing	=	12.00
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa	=	0.822

Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	3,187.8

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	11,337.8

Moment.....Allowable	=	13,786.3

Shear.....Actual

Service Level	psi =	
Strength Level	psi =	26.1

Shear.....Allowable	psi =	82.2

Anet (Masonry)	in2 =	

Wall Weight	psf =	150.0

Rebar Depth 'd'	in =	10.19

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	3,000.0
Fy	psi =	60,000.0

Bottom

SD SD

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

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Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.2553 in ² /ft	
(4/3) * As :	0.3404 in ² /ft	Min Stem T&S Reinf Area 3.073 in ²
200bd/fy : 200(12)(10.1875)/60000 :	0.4075 in ² /ft	Min Stem T&S Reinf Area per ft of stem Height : 0.288 in ² /ft
0.0018bh : 0.0018(12)(12) :	0.2592 in ² /ft	Horizontal Reinforcing Options :
	=====	<u>One layer of :</u> <u>Two layers of :</u>
Required Area :	0.3404 in ² /ft	#4@ 8.33 in #4@ 16.67 in
Provided Area :	0.31 in ² /ft	#5@ 12.92 in #5@ 25.83 in
Maximum Area :	1.6561 in ² /ft	#6@ 18.33 in #6@ 36.67 in

Footing Data

Toe Width	=	1.00 ft
Heel Width	=	4.00
Total Footing Width	=	5.00
Footing Thickness	=	20.00 in

f'c = 3,000 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm = 3.00 in

Footing Design Results

	Toe	Heel	
Factored Pressure	= 5,787	0	psf
Mu' : Upward	= 2,591	509	ft-#
Mu' : Downward	= 282	7,688	ft-#
Mu: Design	= 2,309	7,179	ft-#
φ Mn	= 55,904	45,831	ft-#
Actual 1-Way Shear	= 1.23	18.30	psi
Allow 1-Way Shear	= 82.16	82.16	psi
Toe Reinforcing	= # 8 @ 12.00 in		
Heel Reinforcing	= # 7 @ 12.00 in		
Key Reinforcing	= None Spec'd		
Footing Torsion, Tu	=	0.00 ft-lbs	
Footing Allow. Torsion, φ Tn	=	0.00 ft-lbs	

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 5.55 in, #5@ 8.61 in, #6@ 12.22 in, #7@ 16.66 in, #8@ 21.94 in, #9@ 27.77 in, #10@ 35.27 in

Heel: #4@ 5.55 in, #5@ 8.61 in, #6@ 12.22 in, #7@ 16.66 in, #8@ 21.94 in, #9@ 27.77 in, #10@ 35.27 in

Key: No key defined

Min footing T&S reinf Area 2.16 in²
Min footing T&S reinf Area per foot 0.43 in²/ft

If one layer of horizontal bars:

#4@ 5.56 in
#5@ 8.61 in
#6@ 12.22 in

If two layers of horizontal bars:

#4@ 11.11 in
#5@ 17.22 in
#6@ 24.44 in

Project Title:
Engineer:
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Project Descr:

Cantilevered Retaining Wall

Project File: LS JOC 2.ec6

LIC# : KW-06017929, Build:20.24.09.03

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Summary of Overturning & Resisting Forces & Moments

Item	OVERTURNING.....			RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	2,663.4	4.11	10,952.4	Soil Over HL (ab. water tbl)	3,521.1	3.50	12,323.9
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.50	12,323.9
Hydrostatic Force				Water Table			
Buoyant Force	=			Sloped Soil Over Heel	=		
Surcharge over Heel	=			Surcharge Over Heel	=		
Surcharge Over Toe	=			Adjacent Footing Load	=		
Adjacent Footing Load	=			Axial Dead Load on Stem	=		
Added Lateral Load	=			* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=			Soil Over Toe	=	220.0	110.0
	=			Surcharge Over Toe	=		
				Stem Weight(s)	=	1,600.5	2,400.8
				Earth @ Stem Transitions	=		
				Footing Weight	=	1,250.0	3,125.0
				Key Weight	=		
				Vert. Component	=		
Total	=	2,663.4	O.T.M. = 10,952.4	Total =	6,591.6 lbs	R.M. =	17,959.6
Resisting/Overturning Ratio		=	1.64	* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.			
Vertical Loads used for Soil Pressure	=	7,767.3	lbs				

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
Horizontal Defl @ Top of Wall (approximate only) 0.245 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: LS JOC 2.ec6
(c) ENERCALC, LLC 1982-2024

LIC# : KW-06017929, Build:20.24.09.03

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Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment (25.4.2.3a) =	21.36 in
Development length for #5 bar specified in this stem design segment =	16.43 in
Hooked embedment length into footing for #5 bar specified in this stem design segment =	9.59 in
As Provided =	0.3100 in ² /ft
As Required =	0.3404 in ² /ft

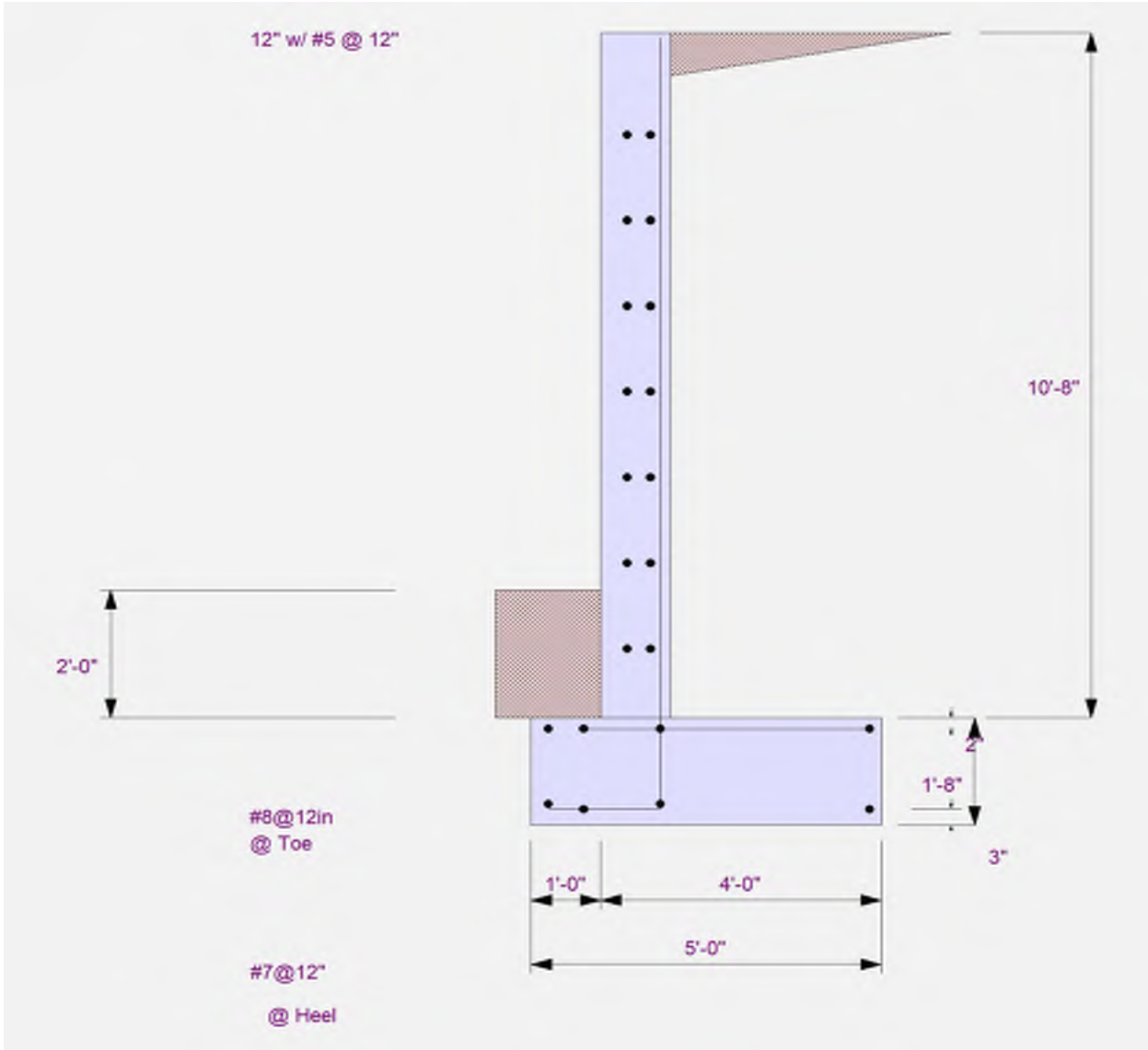
Project Title:
Engineer:
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Cantilevered Retaining Wall

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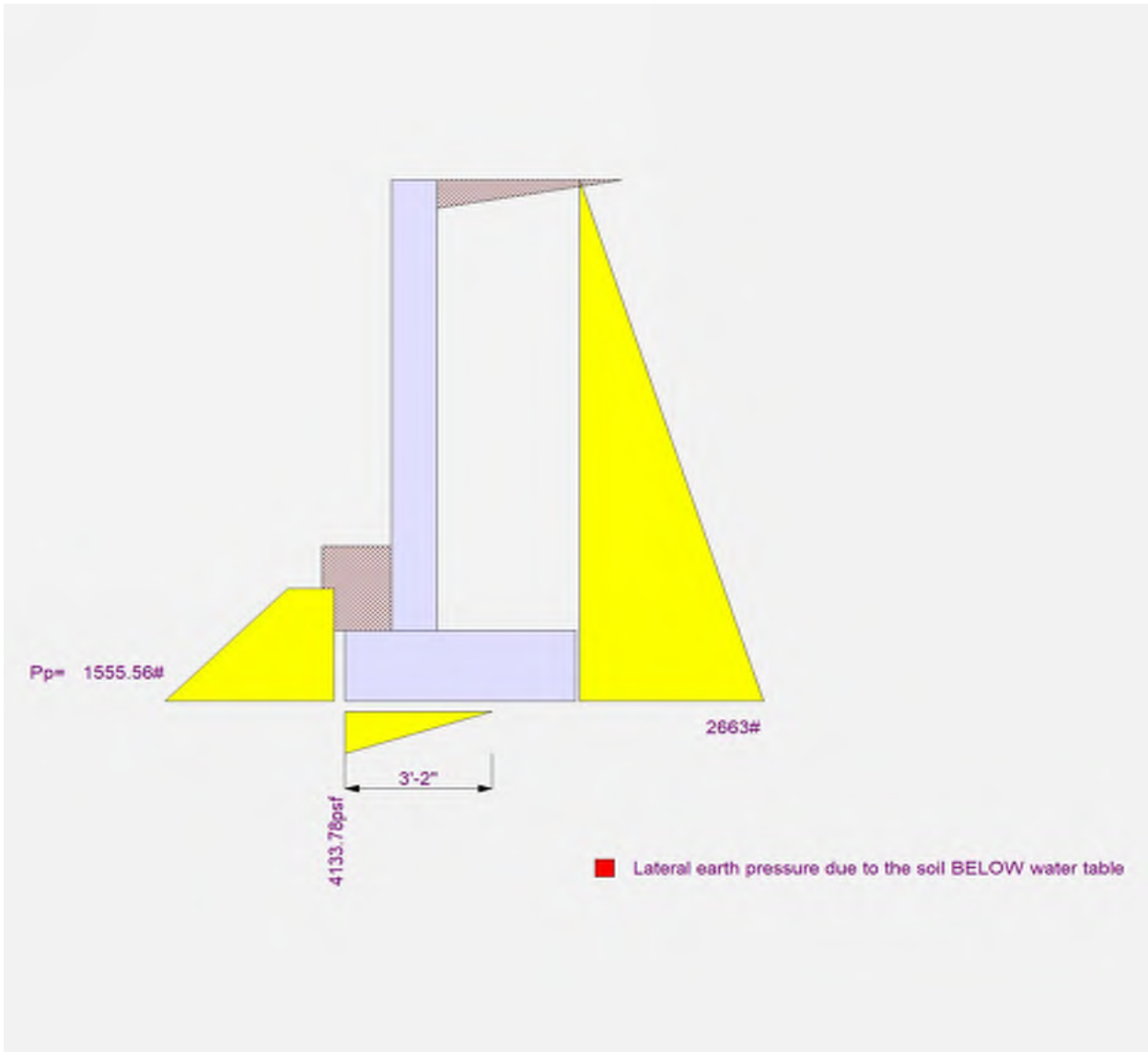
Cantilevered Retaining Wall

LIC# : KW-06017929, Build:20.24.09.03

J&S STRUCTURAL ENGINEERS, P.A.

Project File: LS JOC 2.ec6

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Frost Depth (ft)	3
Allowable Bearing Pressure (ksf)	1.5
Soil Unit Weight (kcf)	0.12
Coefficient of Sliding Friction	0.30
Ultimate Base Adhesion (ksf)	0
Ultimate Passive Pressure (ksf)	0.25
Concrete Weight (pcf)	150
Concrete Strength (psi)	3000

Minimum Dimensions		
	Ext	Int
Width (ft)	2	2
Length (ft)	2	2
Thickness (in)	12	12

Grade Beams/Wall		
	Exterior	Interior
Width (in)	20	0
Depth (in)	36	0
Weight (klf)	0.75	0.00
Dock Ht (ft)	0.00	

Min Steel Ratios	
ρ _{MIN FLEXURE}	0.0033
ρ _{T&S}	0.0018

	Ratios	FS
Bearing	1	1
Uplift	1.00	1
Sliding	1.00	1.0
DL	0.8	1.3

Footing Dims	Location		EXT	EXT	EXT	EXT	EXT	EXT	
	Length/Dia	(ft)	6	6	3	3	3	24	8
	Width	(ft)	6	6	6	3	3	6.5	8
	Thickness	(in)	3	36	36	36	12	36	36
Bearing Capacity	Area	(ft ²)	36	36	18	9	9	156	64
	Bearing Capacity	(kips)	54	54	27	13.5	13.5	234	96
	Allowable Bearing	(kips)	54.00	54.00	27.00	13.50	13.50	234.00	96.00
Uplift Capacity	Total Weight of FTG	(kips)	1.35	16.20	8.10	4.05	1.35	70.20	28.80
	Weight of Dock Wall	(klf)	0.00	0.60	0.60	0.20	0.20	0.20	0.60
	LF of Wall Available	(ft)	24.00	0.00	0.00	25.00	0.00	22.00	0.00
	Total Weight of Wall	(kips)	0.00	0.00	0.00	5.03	0.00	4.42	0.00
	Weight of Soil Over Ftg	(kips)	2.57	0.00	0.00	0.00	0.00	0.00	0.00
	Type of GB Available	-	Ext	Ext	Ext	Ext	Ext	Int	Int
	LF GB Available	(ft)	20.00	24.00	12.00	20.00	20.00	8.00	0.00
	Total Weight of GB	(kips)	24	18	9	15	15	0	0
	Total Dead Load	(kips)	27.92	34.20	17.10	24.08	16.35	74.62	28.80
	Reduced DL	(kips)	22.33	27.36	13.68	19.26	13.08	59.70	23.04
	Uplift Capacity	(kips)	22.33	27.36	13.68	19.26	13.08	59.70	23.04
Sliding Capacity	DL Column Load on Footing	(kips)							
	Weight of Footing	(kips)	1.35	16.20	8.10	4.05	1.35	70.20	28.80
	Weight of Grade Beam	(kips)	24.00	18.00	9.00	15.00	15.00	0.00	0.00
	Weight of Soil on Footing	(kips)	2.57	0.00	0.00	0.00	0.00	0.00	0.00
	Total DL on Footing	(kips)	27.92	34.20	17.10	19.05	16.35	70.20	28.80
	Reduced DL	(kips)	22.33	27.36	13.68	15.24	13.08	56.16	23.04
	Footing-Soil Interface Friction Angle	(deg)	16.70	16.70	16.70	16.70	16.70	16.70	16.70
	Frictional Resistance	(kips)	6.70	8.21	4.10	4.57	3.92	16.85	6.91
	Base Adhesion Capacity	(kips)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	FTG Passive Pressure Capacity	(kips)	0.00	0.39	0.00	0.00	0.00	0.00	0.00
	LF GB Available	(ft)	0.00	24.00	12.00	20.00	20.00	8.00	0.00
	GB Passive Pressure Capacity	(kips)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Hairpin Capacity	(kips)	0.00		0.00	0.00	56.00		
	Total Sliding Resistance	(kips)	6.70	8.60	4.10	4.57	59.92	16.85	6.91
	Sliding Capacity	(kips)	6.70	8.60	4.10	4.57	59.92	16.85	6.91
Footing & Column Dimensions	Baseplate Dim in Direction of Footing Length	(in)	6	8	8	8	8	8	8
	Baseplate Dim in Direction of Footing Width	(in)	10.1875	8	8	8	8	8	8
	d	(in)	-1.5	31.5	31.5	31.5	7.5	31.5	31.5
	q _u (Allowable Bearing)	(ksf)	1.50	1.50	1.50	1.50	1.50	1.50	1.50
	q _u (Allowable Uplift) Controlling Moment	(ksf)	0.6203378	0.76	0.76	2.14	1.45333333	0.38267692	0.36
1-Way Shear (L)	x	(ft)	2.70	0.04	-1.46	-1.46	0.54	9.04	1.04
	V _{u1}	(k)	24.30	0.37	-6.56	-6.56	2.44	325.50	12.50
	φV _c	(k)	-8.87	186.34	186.34	93.17	22.18	745.34	248.45
	Ratio	-	2.74	0.00	0.04	0.07	0.11	0.44	0.05
1-Way Shear (W)	x	(ft)	2.70	0.04	0.04	-1.46	0.54	0.29	1.04
	V _{u1}	(k)	24.30	0.37	-13.13	-6.56	2.44	88.16	12.50
	φV _c	(k)	-8.87	186.34	186.34	93.17	22.18	201.86	248.45
	Ratio	-	2.74	0.00	0.07	0.07	0.11	0.44	0.05
Punching Shear (L)	V _{u2}	(k)	53.79	37.75	10.75	-2.75	11.00	217.75	79.75
	bo	(in)	18	158	158	158	62	158	158
	φV _{c2}	(k)	-4.44	817.80	817.80	817.80	76.41	817.80	817.80
	Ratio	-	12.12	0.05	0.01	0.00	0.14	0.27	0.10
Punching Shear (W)	V _{u2}	(k)	53.21	37.75	10.75	-2.75	11.00	217.75	79.75
	bo	(in)	34.75	158.00	158.00	158.00	62.00	158.00	158.00
	φV _{c2}	(k)	-8.57	817.80	817.80	817.80	76.41	817.80	817.80
	Ratio	-	6.21	0.05	0.01	0.00	0.14	0.27	0.10
Reinforcement	Size of Bar	-	#5	#5	#6	#6	#8	#6	#6
	m	-	23.53	23.53	23.53	23.53	23.53	23.53	23.53
	x' _{Length}	(ft)	2.75	2.67	1.17	1.17	1.17	11.67	3.67
	A _{s T&S Length}	(in ²)	0.39	4.67	2.33	2.33	0.78	18.66	6.22
	Number of Bars For T&S	-	2	16	6	6	1	43	15
	x' _{Width}	(ft)	2.58	2.67	2.67	1.17	1.17	2.92	3.67
	A _{s T&S Width}	(in ²)	0.39	4.67	4.67	2.33	0.78	5.05	6.22
	Number of Bars For T&S	-	2	16	11	6	1	12	15
	M _u	(k-ft)	5.67	5.33	1.02	1.02	1.02	102.08	10.08



Date:
Project Name:
Project No.:
Subject:
Computed by:

7/1/2024	Page:
Vehicle Bldg	
24-088	
Footing Size	
KJ	Checked by:

Frost Depth (ft)	3
Allowable Bearing Pressure (ksf)	1.5
Soil Unit Weight (kcf)	0.12
Coefficient of Sliding Friction	0.30
Ultimate Base Adhesion (ksf)	0
Ultimate Passive Pressure (ksf)	0.25
Concrete Weight (pcf)	150
Concrete Strength (psi)	3000

Grade Beams/Wall		
	Exterior	Interior
Width (in)	20	0
Depth (in)	36	0
Weight (klf)	0.75	0.00
Dock Ht (ft)	0.00	

	Ratios	FS
Bearing	1	1
Uplift	1.00	1
Sliding	1.00	1.0
DL	0.8	1.3

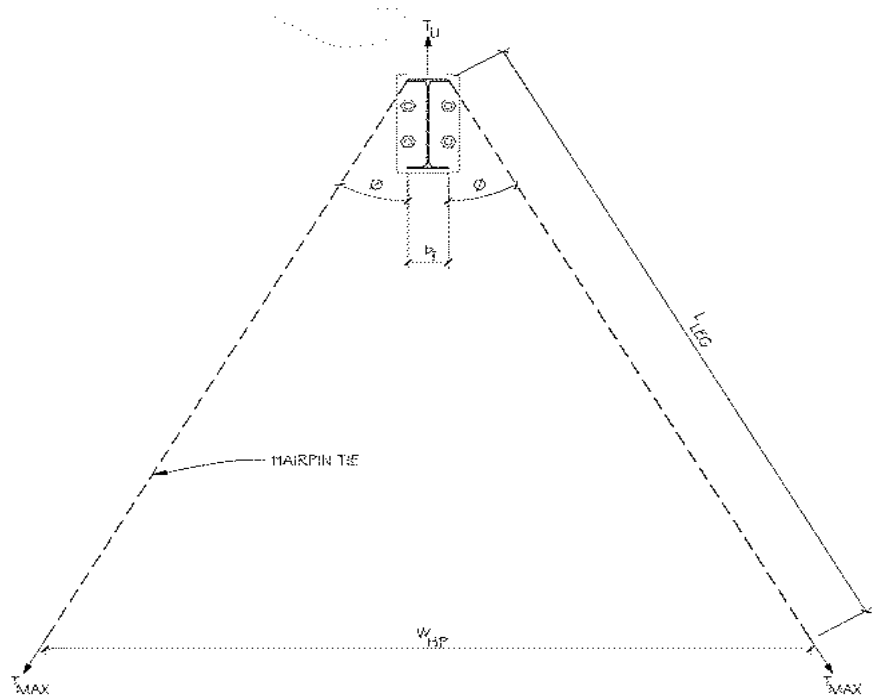
Min Steel Ratios	
$\rho_{\text{MIN FLEXURE}}$	0.0033
$\rho_{\text{T\&S}}$	0.0018

Minimum Dimensions		
	Ext	Int
Width (ft)	2	2
Length (ft)	2	2
Thickness (in)	12	12

Reinforcement For Bearing (Longitudinal - L)	R _u	(psi)	2800.93	5.97	1.14	1.14	20.16	114.31	11.29
	ρ _{REQ'D}	-	#NUM!	0.0001	0.0000	0.0000	0.0003	0.0019	0.0002
	A _s REQ'D	(in ²)	#NUM!	0.23	0.02	0.02	0.09	17.69	0.57
	Number of Bars Required	-	#NUM!	1	1	1	1	41	2
	A _s Provided	(in ²)	#NUM!	0.31	0.44	0.44	0.79	18.04	0.88
	A _s FLEXURE Provided	(in ²)	#NUM!	0.30	0.03	0.03	0.12	23.53	0.76
	Number of Bars Provided	-	#NUM!	1	1	1	1	54	2
	A _s USED	(in ²)	#NUM!	0.31	0.44	0.44	0.79	23.76	0.88
Reinforcement For Bearing (Transverse - W)	M _u	(k-ft)	4.97	5.33	5.33	1.02	1.02	6.38	10.08
	R _u	(psi)	2456.7806	5.9722	5.9722	1.1431	20.1646	7.1445	11.2912
	ρ _{REQ'D}	-	#NUM!	0.0001	0.0001	0.0000	0.0003	0.0001	0.0002
	A _s REQ'D	(in ²)	#NUM!	0.23	0.23	0.02	0.09	0.29	0.57
	Number of Bars Required	-	#NUM!	1	1	1	1	1	2
	A _s Provided	(in ²)	#NUM!	0.31	0.44	0.44	0.79	0.44	0.88
	A _s FLEXURE Provided	(in ²)	#NUM!	0.3005993	0.3005993	0.02874101	0.12116617	0.38966058	0.7585556
	Number of Bars Provided	-	#NUM!	1	1	1	1	1	2
A _s USED	(in ²)	#NUM!	0.31	0.44	0.44	0.79	0.44	0.88	
Reinforcement For Uplift (Longitudinal - L)	M _u	(k-ft)	2.35	2.70	0.52	1.46	0.99	26.04	2.42
	R _u	(psi)	1158.35	3.03	0.58	1.63	19.54	29.16	2.71
	ρ _{REQ'D}	-	0.0296	0.0001	0.0000	0.0000	0.0003	0.0005	0.0000
	A _s REQ'D	(in ²)	-3.2016	0.1144	0.0109	0.0308	0.0883	4.4350	0.1367
	Number of Bars Required	-	-11	1	1	1	1	11	1
	A _s Provided	(in ²)	-3.41	0.31	0.44	0.44	0.79	4.84	0.44
	A _s FLEXURE Provided	(in ²)	-4.258165	0.1522155	0.0145605	0.04100777	0.11738194	5.89848727	0.181746
	Number of Bars Provided	-	-11	1	1	1	1	14	1
A _s USED	(in ²)	-3.41	0.31	0.44	0.44	0.79	6.16	0.44	
Reinforcement For Uplift (Transverse - W)	M _u	(k-ft)	2.06	2.70	2.70	1.46	0.99	1.63	2.42
	R _u	(psi)	1016.02	3.03	3.03	1.63	19.54	1.82	2.71
	ρ _{REQ'D}	-	0.0233	0.0001	0.0001	0.0000	0.0003	0.0000	0.0000
	A _s REQ'D	(in ²)	-2.5213	0.1144	0.1144	0.0308	0.0883	0.0747	0.1367
	Number of Bars Required	-	-9	1	1	1	1	1	1
	A _s Provided	(in ²)	-2.79	0.31	0.44	0.44	0.79	0.44	0.44
	A _s FLEXURE Provided	(in ²)	-3.353386	0.1522155	0.1522155	0.04100777	0.11738194	0.09930545	0.181746
	Number of Bars Provided	-	-9	1	1	1	1	1	1
A _s USED	(in ²)	-2.79	0.31	0.44	0.44	0.79	0.44	0.44	
Summary	Bar Size	-	#5	#5	#6	#6	#8	#6	#6
	No. of Long. Bars @ Bott	-	#NUM!	8	3	1	1	54	8
	No. of Trans Bars @ Bott	-	#NUM!	8	6	1	1	6	8
	No. of Long. Bars @ Top	-	#NUM!	1	1	3	1	14	1
	No. of Trans Bars @ Top	-	#NUM!	1	1	3	1	1	1
	LF of GB Used	(ft)	20.00	24.00	12.00	20.00	20.00	8.00	0.00
	Thickness	(in)	3	36	36	36	12	36	36
	Width	(ft)	6	6	3	3	3	24	8
	Length	(ft)	6	6	6	3	3	6.5	8
	Allowable Vertical Load	(kips)	54.00	54.00	27.00	13.50	13.50	234.00	96.00
	Allowable Uplift Load	(kips)	22.33	27.36	13.68	19.26	13.08	59.70	23.04
	Allowable Horizontal Load	(kips)	6.70	8.60	4.10	4.57	59.92	16.85	6.91



Hairpin = #6
 $f'_c = 4000.0$ psi
 $\Theta = 30$ deg
 $b_{f\text{ col}} = 8$ in
 Slab = 6x6 W2.9xW2.9



Max Factored Horizontal Reaction

$$1.2(D+CG) + 1.6S \rightarrow 43.02 \text{ kips}$$

Where:

$$\begin{aligned} D &= 3.4 \text{ kips} \\ CG &= 8.85 \text{ kips} \\ S &= 17.7 \text{ kips} \end{aligned}$$

T_{MAX} Hairpin Reinforcment (One Leg)

$$T_{max} = 0.9F_y A_s \rightarrow 23.76 \text{ kips}$$

Where:

$$\begin{aligned} f_y &= 60 \text{ ksi} \\ A_s &= 0.44 \text{ in}^2 \end{aligned}$$

Hairpin Tie Properties		
Bar Size	d_b	A_s (in ²)
	(in)	(in ²)
#3	0.375	0.11
#4	0.500	0.20
#5	0.625	0.31
#6	0.750	0.44
#7	0.875	0.60



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Date:	11/1/2024	Page:
Project Name:	Bump City	
Project No.:	24-088	
Subject:	Hairpin Tie Capacity	
Computed by:	KJ	Checked by:

Development Length for Hairpin Tie

$$L_d = \frac{d_b f_y \alpha \beta \lambda}{25 \sqrt{f'_c}} \rightarrow 28.5 \text{ in}$$

Where:

$d_b = 0.75 \text{ in}$
 $\alpha = 1.0$ (All Other Locations)
 $\beta = 1.0$ (Uncoated)
 $\lambda = 1.0$ (Normal Weight Aggregates)

Spice Length for Hairpin Tie

$$L_s = 1.3 L_d \rightarrow 37.00 \text{ in} \rightarrow 3.5 \text{ ft}$$

(Class B Spice)

Hairpin Leg Length, L_{LEG}

$$10.0 \text{ ft} \rightarrow 120 \text{ in}$$

Hairpin Width, W_{HP}

$$W_{HP} = 2 L_{LEG} \sin \theta + b_{f, col} \rightarrow 128 \text{ in}$$

A_s From Slab Reinforcement over W_{HP}

$$A_s = W_{HP} (A_s / LF) \rightarrow 0.62 \text{ (in}^2\text{)}$$

Where:

$$A_s / LF = 0.058 \text{ in}^2 / LF$$

Slab Reinforcement Properties				
Slab Reinforcement	A_s (in ²)	Per X Inches (in)	A_s / LF (in ² /LF)	f_y (ksi)
6X6 W1.4xW1.4	0.014	6	0.028	65
6X6 W2.9xW2.9	0.029	6	0.058	65
6X6 W4.0xW4.0	0.04	6	0.080	65
#3 @ 24" OC EW	0.11	24	0.055	60
#4 @ 18" OC EW	0.196	18	0.131	60

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Date:	11/1/2024	Page:
Project Name:	Bump City	
Project No.:	24-088	
Subject:	Hairpin Tie Capacity	
Computed by:	KJ	Checked by:

#3 @ 18" OC EW	0.11	18	0.073	60

 T_{MAX} From Slab Reinforcement over W_{HP}

$$T_{max} = 0.9F_y A_s \rightarrow 36.192 \text{ kips}$$

Where:

$$f_y = 65 \text{ ksi}$$

Ultimate Tensile Load (Based on Strength Design)

$$T_{u \text{ SLAB}} = 36.19 \text{ kips}$$

$$T_{u \text{ Hairpin}} = 2T_{Max \text{ Hairpin}} \cos(\theta) \rightarrow 41.15 \text{ kips}$$

$$T_u = \text{Min of } T_{u \text{ SLAB}} \text{ \& } T_{u \text{ Hairpin}} \rightarrow T_u = 36.19 \text{ kips}$$